[redacted]E RAMO-WOOLDRIDGE COR[redacted]RATION
LOS ANGELES 45, CALIFORNIA
INTEROFFICE CORRESPONDENCE

GM 01-440

Ng 2-

TO: Col. C. H. Terhune

CC: Col. R. Curtin
Col. H. L. Evans
W. B. Hebenstreit
R. F. Mettler
S. Ramo

DATE: May 13, 1958

SUBJECT: STL Responsibilities in the 117L Program

FROM: Louis G. Dunn

This memorandum is written to outline my understanding of the STL responsibilities in the 117L program. This understanding is based upon the meetings which you and I had on this subject several months ago, following the extensive separate conversations which Dr. Mettler and Mr. Hebenstreit had with Colonel Oder and Colonel Evans.

In general, it is my understanding that the decision was made to require Lockheed to carry out in full its role as the system engineering contractor for the 117L flight vehicle, along with its role as the development and production contractor for the second stage of the 117L vehicle. As I recall, special meetings were to be held with Lockheed management to require them to draw from the total manpower resources of the Lockheed Corporation to properly perform their several tasks in the 117L program. It is, therefore, my impression that Lockheed's responsibilities include, but are not limited to, the following:

a. System engineering for the two-stage flight vehicle, including complete dynamic analysis of the two-stage vehicle, trajectory analysis, stability and control analysis, detailed system test planning, analysis of flight data, diagnosis of flight failures, etc.

b. Development and testing of the second stage.

c. Identification and specification to AFBMD of any modifications required in the standard Thor or Atlas boosters allocated by AFBMD to the 117L program, and identification and specification to AFBMD of any modifications required in GSE and facilities for launching 117L vehicles from AFMTC and/or Cooke Air Force Base.

d. Assistance to AFBMD as required to verify that the modified booster when delivered does in fact meet the Lockheed-specified requirements, and assistance to AFBMD in contractually accepting the modified booster hardware.

e. Engineering liaison directly with Convair and Douglas as required to identify and specify to AFBMD changes needed in the boosters to satisfy the Lockheed system engineering requirements, to work out any interface problems on those missiles allocated to the 117L program, and to identify and specify to AFBMD all GSE and facility requirements for launching of 117L vehicles.

f. Technical test direction for the flight testing of all 117L vehicles, both at AFMTC and Cooke Air Force Base, using Convair and Douglas as test conductors for the booster stages.

g. Checkout and operation of the second stage for flight testing.

It is my understanding that STL has the following responsibilities in the 117L program:

A. Staff assistance to AFBMD, upon specific request, to assist in the allocation and scheduling of standard unmodified boosters for the 117L program.

B. Staff assistance to AFBMD, upon specific request, to assist in evaluating certain special technical problems in the 117L program.

C. System engineering for the standard booster as delivered to the Air Force for the Thor and Atlas weapon system programs, not including 117L modifications.

D. Preparation of guidance equations for the Atlas ground guidance stations used for 117L launchings. (This part of the Atlas system is treated as a special case and differently from the Atlas missiles because, as fixed ground equipment, it must remain interchangeable for both standard Atlas and 117L launchings.)

It is my understanding that STL does not have any of the following responsibilities (except insofar as specific requests for staff assistance to AFBMD under Items A and B above overlap the items listed below):

1. Any system engineering responsibility for the two-stage flight vehicles.

2. Any responsibility for the identification and/or specification of the modifications to the booster required for 117L purposes.

3. Any responsibility for assisting AFBMD in contractually accepting the boosters allocated to the 117L program, after the Lockheed-specified modifications have been made to the boosters.

4. Any responsibility for the technical test direction of 117L launchings, either at AFMTC or at Cooke Air Force Base.

5. Any responsibility for the specification and/or development of proper launching facilities for 117L vehicles at either AFMTC or Cooke Air Force Base.

6. Any responsibility for diagnosis of flight failures of 117L vehicles or analysis of 117L flight test data.

I would like to discuss the role of STL in the 117L program with you if the responsibilities outlined above for STL do not represent a mutual AFBMD/STL understanding.

LGD:RFM:dm

Louis G. Dunn

DEC 7 1956

WDTR

SUBJECT: Distribution of Reports for WS 117L

TO: Ramo-Wooldridge Corporation
Attn: Mr. F. A. Ford

Neely

1. The purpose of this letter is to formalize the report handling procedure in order to effect a minimum transmittal time. WDD DOI 11-7 will be adhered to.

2. Official reports, memoranda and/or information generated within and/or for the Ramo-Wooldridge Corporation WS 117L Group will be distributed on a WDD/R-W "A Priori" distribution list. It shall be required that prior to any reproduction of WS 117L information as defined herein, coordination will be effected with WDSIT and WDTR. It is further requested that the "A Priori" distribution list become part of the document reproduced. All reproduced copies of WS 117L information will be submitted to WDSIT. Those documents as specified in the distribution list for R-W will be sent to R-W by WDSIT "en bloc." Distribution of the remaining documents will be made by WDSIT as approved by WDTR. This procedure does not apply to R-W internal notes or memoranda, unless accompanied by an official letter of transmittal signed by someone who can certify that the information represents the Corporation's views.

3. Inclosure 1 includes the distribution required by WDTR. A standard distribution list for appropriate personnel within R-W who will receive all such reports, should be supplied to WDSIT through WDTR for approval.

4. Reports, memoranda, and/or information from other Air Force contractors, but deemed applicable and of use to WS 117L by R-W shall be handled in the following manner:

a. Send a request to WDSIT requesting that a given report (defined in sufficient detail in the request) be sent to Lockheed Aircraft Corporation, Missile Systems Division.

b. WDSIT will get the required number of copies of the document and prepare for distribution to Lockheed.

c. WDSIT will coordinate with WDTR for approval prior to transmission.

5. Three (3) copies of documents referred to in paragraph 4 will be sent to Lockheed Aircraft Corporation, Missile Systems Division, Attn: Mr. Robert Salter, P.O. Box 504, Sunnyvale, California

SIGNED

1 Incl:
Distribution List
of R-W Reports
required by WDTR

FREDERIC C. E. ODER
Lt. Colonel, USAF
Assistant for WS 117L
Technical Operations

WDT 13 November 1957

MEMORANDUM TO DR. DUNN - STL

SUBJECT: Space Flight Program

1. During the past week it has become increasingly apparent that a more detailed definition of an astronautics program for the Air Force is needed to back up our initial work in this area for the Yates Board, the AFDAP Study, and the 117L Program. It is therefore requested that Space Technology Laboratories of R-W prepare such a development program to cover ten to fifteen years in the future.

2. It is expected that such a program will provide stimulus for many detailed R&D projects in the future and will outline the course of development in future weapon systems which should be followed in the Air Force. A first draft of this work should be ready for inclusion in the 2 December briefing to Hq ARDC - this to be improved upon for the mid-December briefing to the Air Force Scientific Advisory Committee.

3. Subsequent to these two presentations it is believed essential to finalize the work in this area at the earliest possible time to provide necessary guidance to Hq USAF.

SIGNED

CHARLES H. TERHUNE, JR.
Colonel, USAF
Deputy Commander
Weapon Systems

Cys to Col Ely
Lt Col Bogert

Briefing on 16th to BAS
on mgt philo re STL and
control over Lockheed

[redacted]

NOTES ON WS-117L MANAGEMENT

8 April 1958

1. Steering Task Group

A reasonably complete treatment of this subject is contained in the attached memorandum. However, it is worth repeating that a Steering Task Group is no substitute for detailed, daily, line direction of a program. It is a device for insuring that the top managers involved meet on a regular basis so as to insure current major problems are understood, recognized and under attack at the proper levels.

2. STL Role

The extent to which STL participates in the program is to some extent dependent upon the action following Mr. Douglas' current efforts with the principal officers of the corporations concerned. However, benefit can be derived from interim arrangements which can be implemented immediately. In essence these would be to create within STL a group, presumably small, attached directly to the WDT Program Office for the purpose of performing technical analyses and staff assistance. It would not seem to be politic to delegate to this group any "technical direction" powers of the kind normally exercised by the R-W contingents in other programs. On the other hand, there seems no reason why they should not be engaged in "systems engineering".

3. Program Records

In the past the program records, particularly schedules, have been notably skimpy - at least insofar as the operation of the Program Control Room and the related procedures are concerned. Inquiry reveals that a major re-work of Program Control Room data is commencing and that current plans visualize the conversion of the ballistic missile program into the new format in advance of undertaking WS-117L data. It might be wise to reverse the order of these undertakings so that the -117L program becomes the first to be recorded under the new scheme. Particularly significant is the fact that the new program records will indicate in milestone-by-milestone fashion of the responsible persons or office. This is a very desirable feature.

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4. Lockheed Monthly Meetings

In view of the fact that the WS-117L program as a whole will require major inputs from activities and sources other than Lockheed, it might be worthwhile to consider moving the location of the monthly meetings now held at Palo Alto to Inglewood where there is a possibility of greater participation by individuals in the complex.

5. THOR/-117L Program

The reason for withholding R-W participation as full scale systems engineering and technical director participation in the program has been their involvement in the data handling and infra-red systems. These systems are not involved in the THOR/-117L program. The possibility, therefore, exists that the THOR/-117L can be sufficiently divorced from the balance of the program so that R-W might play a more potent part.

6. Utilization of BMD

Private inquiry reveals that admirable corporation and mutual support exists between the Program Office and the BMD contingent therein. Since the local management complex must handle through Lockheed many of the things currently handled direct with associate contractors in other programs, it is important that this relationship be continued and that the full capabilities of the AMC be utilized so that the performance of subordinate tiers of sub-contractors and suppliers can be closely monitored and stimulated.

1 Incl
Cy Memo for Gen Schriever,
12 Mar 58, subj: Summary of
Findings of WS-117L Mgmt Proj
w/1 Incl

[redacted]

marked by [illegible]

[redacted]

WDCG 12 March 1958

MEMORANDUM FOR GENERAL SCHRIEVER

SUBJECT: Summary of Findings of WS-117L Management Project

1. The findings which follow are based upon a visit to Admiral Raborn's activity, reading of the development plan and other current -117L documents, and general knowledge of the program content through past association. Since the WS-117L Program Office is fully engaged at this time in a crash effort connected with the new development plan and fund requirements, it has not yet been possible to explore in detail either current procedures or possible future alterations in management procedures.

2. At the outset it is worth comparing the posture of the Atlas program when it was accelerated in 1954 with the current posture of the WS-117L program. In 1954 the ICBM program (Atlas only at that time) enjoyed the full time attention of a number of senior officers and a growing number of junior officers and civilians as well as substantial assistance from the R/W Corporation. In the main the specific help rendered by outside individuals such as Mr. Gardner, General Power, the Scientific Advisory Committee, etc., was positive and more or less continuous. The situation is considerably different relative to the WS-117L program today. It may be that it has played second fiddle to other local programs so long that it will be difficult to get a proper degree of acceleration and attention. In any event the amount of attention devoted and devotable by senior individuals to the program will have a major influence in its success or lack thereof - both schedule-wise and qualitatively. I take such matters seriously because I personally believe that serviceable satellites broadly utilized will have a much more constructive and powerful influence on all aspects of world affairs than either ballistic missile or man-in-space programs. The U.S. should lead in this and the Air Force must be its instrument.

3. Application of Polaris Management Techniques.

a. It seems an obvious fact that for WS-117L we cannot at this time gather into our hands in the local complex the same kind of systems management and technical direction as has existed in the missile programs since activities like Rome ADC and Lockheed subcontractors cannot be directly controlled by a line arrangement using R/W. Therefore it might be well to adopt a technique applied successfully by Admiral Raborn's people. This is the specific

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identification of responsible offices or people down to a significantly lower level of action and milestones than we do currently. In essence this would elaborate the current AFBMD technique of assigning responsibilities through office functional descriptions and through signature blocks on large groups of milestones assembled on charts.

b. There would be a net benefit in adopting at least as an interim measure Admiral Raborn's technique of creating a "Steering Task Group" chairmanned by an AFBMD individual and having representation from the interested contractors, military elements and others who contribute to the program.

(1) Admiral Raborn's Steering Task Group is composed as follows:

Special Projects Office SP 20	(Chairman)	Capt.L.Smith	Represents Admiral Raborn
Lockheed Missile System Division		Mr.W.Hawkins	- -
Bureau of Ships (Code 420)		Capt.E.Arentzen	Chief of Submarine Design
Chief of Naval Operations (OP-515)		Cmdr.P.H.Backus	Chief of Ballistic Missile Activities under Admiral Clark
Chief of Naval Operations (OP-311)		Capt.F.W.Walker	Chief of Submarine Warfare Branch under the CNO
Massachusetts Institute of Technology		Dr.C.S.Draper	- -
Atomic Energy Commission (UCRL)		Dr.H.Brown	- -
Naval Ordnance Laboratory		Dr.P.M.Fye	- -
General Electric		Mr.R.C.Berendsen	- -
Aerojet-General Corporation		Mr.R.Geckler	- -
Westinghouse Electric Corporation		Dr.G.H.Mechlin	- -
Sperry Gyroscope Co.		Dr.W.L.Barrow	- -

[redacted]

(2) A comparable set of titles for the WS-117L program might be as follows:

Chairman	Represents General Schriever
Lockheed representative	
Convair representative	
Douglas representative	
Ramo-Wooldridge representative on the data processing system	
Rome ADC representative	
Cambridge Research Center representative	
______________________(?)	Whoever can represent the communications system involved
Intelligence representative	
Meteorological representative.	

It should be noted that the representative on Admiral Raborn's committee is fairly high level. The efficacy of such an arrangement depends upon this fact. We discussed the operation of the Group with Admiral Raborn and with his people. His working elements viewed the Group as a body of people who assembled every six weeks or so to solve important problems. Admiral Raborn seemed to view the same Group as a method for keeping the various agencies participating in his program happy through the device of frequent cooperative meetings at which they discover or discuss mutual problems. Admiral Raborn has a "board of directors" composed of himself and three or four key staff members who meet together when required to decide important issues. It is true that the situation with which Admiral Raborn has to deal in the Navy is different from the usual Air Force situation in that the bureaus are more tradition-bound and jealous of their prerogatives than comparable Air Force institutions. So far the Steering Task Group; plus Admiral Raborn's level of assignment; plus the priority of the program; plus the fact that many Naval personnel now see the end of surface warships has succeeded in keeping all the essential elements of the Polaris program pulling essentially in the same direction.

[redacted]

3. While not a management technique per se, there is a point of view relative to management held by Admiral Raborn and well propagated through his staff which is worth attention. It is represented by the attached diagram and its description. The "centers of authority" of concern to the Polaris effort are such institutions as BuShips, the AEC, Navy contractors, BuYards and Docks, BuSupply and Accounts, etc. When asked how they would draw their own set of circles relative to such institutions, their reply was that they had the authority to direct any activity in the Navy within the scope of their project.

4. The Polaris program has not yet met with very many of the problems attending the onset of testing nor those attaining the commencement of operational use. However, participation by the user elements of the Navy as well as logistic and training elements seems to have been heavy and continuous. They are represented on the Steering Task Group. Many of Admiral Raborn's local staff have been drawn from such activities. A substantial Raborn office related to the Bureau of Personnel is in the process of being created. I mention this for the following reason. While SAC/MIKE has done some preliminary planning relative to the concepts of employment, it is not entirely clear that the mundane, somewhat unattractive but nevertheless difficult problems of establishing and operating field activities are being identified and the initial implementing actions put underway soon enough to meet the requirements of the accelerated program. This may be an unjust remark since I've really not yet been able to delve particularly deep into these aspects. Admiral Raborn's Steering Task Group plus the backgrounds of the individuals selected for his activity seems to have given him an early start on these problems. On the other hand, both the Polaris office and the bureaus are dealing with relatively familiar objects while the WS-117L field operations have no particular precedents.

5. In considering the composition of a possible ARS "Steering Task Group" user-representation is worth some thought. Current planning is that the Strategic Air Command will operate the system. There are some pitfalls connected with this course of action in that SAC in no instance that I can remember has ever furnished a service to anybody except themselves. The ARS system in its daily operation is essentially a service activity which will furnish many kinds of data to many kinds of consumers - most of whom are not in SAC. It is conceded that SAC can develop the ARS operation so that it will furnish very fine strategic reconnaissance information to Headquarters SAC. I question whether that command is psychologically adapted to furnishing an equal quality of service to other possible consumers. For example,

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communication usages and meteorological usages might be heavily underplayed. In fact these kinds of usages might be the very ones that we would want to accent as a matter of national policy as opposed to strictly secret intelligence uses aimed at a war-like purpose. The reason for bringing this up is that user representation, if possible, should cover all probable aspects of WS-117L utilization.

6. Recommendations.

a. That the Steering Task Group approach with technical, logistic and user representation be strongly considered for application to the WS-117L program provided that high enough level of representation is possible. This may be especially important from a "system engineering and technical direction" point of view since we may not be able to solve the R/W-STL problem for some months.

b. That specific assignment of responsibilities be made at somewhat lower level of action in the WS-117L program as compared to our ballistic missile programs. This would compensate for the fact that the current situation prevents us from having as firm a control of the ARS program as we have of the ballistic missile programs.

SIGNED

1 Incl
Dynamics of SP
Mgmt Staff Work

WILLIAM A. SHEPPARD
Colonel, USAF
Assistant for ICC

[redacted]

WDTO 4 February 1958

MEMORANDUM FOR GENERAL RITLAND

SUBJECT: Exclusion of Hardware Clause in the R-W Contract

1. Reference our conversation this morning, the "Exclusion of Hardware" clause in the current R-W contract reads as follows:

> "The Contractor agrees that due to its unique position in the administration and supervision of the Program contemplated hereunder, the Ramo-Wooldridge Corporation will not engage in the physical development or production of any components for the use in the ICBM and IRBM contemplated herein, except with the express approval of the Assistant Secretary of the Air Force (Materiel) or his authorized representative."

These words are first found in a letter from General Schriever to ARDC in October 1954 and were compiled as a result of the 3 September meeting in Mr. Lewis' office. They were placed in the R-W contract in Supplement #4, dated 16 September 1955.

2. Incidental to the hardware exclusion problem, Max Golden is giving BMO a hard time on the removal of ARS from this exclusion clause (ARS got in by accident about 18 months ago). You mentioned wanting to increase the scope of effort on 117L to include systems engineering. The timing would seem inappropriate to add the words "systems engineering" in conjunction with 117L. It seems reasonable at this point that R-W will get the contract from Rome for the infra-red job. I am sure that Max Golden will interpret this as hardware production and would then consider that giving R-W systems engineering on 117L would create a conflict of interests. Personally, I don't think that such a conflict would exist in reality; however, I am bringing this matter to your attention only so that you and General Schriever can be made aware of the fact that we should probably clean up the present problem with Max Golden before starting a potential second one.

J. S. BOGERT
Lt Colonel, USAF
Chief, Programs & Procedures Office
Weapon Systems

[redacted]

WDTR

10 Sep 56

SUBJECT: R-W Responsibility in Connection with the WS 117L Program

TO: Ramo-Wooldridge Corporation
ATTN: Dr. Ramo

1. For some time, the obligation undertaken by the Ramo-Wooldridge Corporation on behalf of the Western Development Division has included certain tasks in support of USAF interest in satellite vehicles. The purpose of this letter is to define further the specific future duties seen for the Ramo-Wooldridge Corporation in connection with the recently approved Weapons System 117L (Advanced Reconnaissance System (ARS), management responsibility for which has been assigned to the Western Development Division. The following guidance is to enable continued planning by your company to provide these services. Separate action is currently being taken to revise the work statement of Contract AF 18(600)-1190 to properly include the requirements of this letter.

2. In general, the WS 117L program encompasses a system development contract plus supporting technical development a number of ARDC centers. The Air Force plans to contract with the Lockheed Aircraft Corporation for the development of the ARS. Lockheed will be the prime systems contractor and have overall systems responsibility.

3. A part of the ARS program involves very close interaction with the WS 107A program. Also, it is important that the WS 117L program be carried out with minimum interference to the WS 107A program and maximum mutual support between the two programs. In those areas of interaction between WS 107A and WS 117L, in particular, the integration of the powered orbiting vehicle with the ICBM vehicle from both the development and testing point of view, the Ramo-Wooldridge Corporation will provide technical advice and studies, as needed, to the Assistant for WS 117L, Technical Operations, WDD, for assistance in his direction of the program. Ramo-Wooldridge will also be responsible for furnishing similar technical support on the problems of the ICBM-ARS integration to other participants in the ARS program as requested by the Assistant for WS 117L.

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4. An additional area in which the assistance of the Ramo-Wooldridge Corporation is desired is in conducting, on request of the Western Development Division, such additional systems studies, review and criticisms of various reports, proposals, and technical work statements, and operational research studies as may be required to permit the Western Development Division to intelligently guide the efforts of the prime systems contractor and the related technical development program.

5. It is felt that the above functions could best be performed by a nucleus of permanent Ramo-Wooldridge personnel who would become intimately familiar with ARS problems, supplemented from time to time by other specialists as the problems at hand may require. For planning purposes, it is estimated that for the balance of FY 1957 the engineering manpower required of the Ramo-Wooldridge Corporation for the WS 117L program will be about six full time engineers or scientists.

6. The security factor of your participation in the ARS program will require special consideration. Particularly high security sensitivity is associated with the ARS as a national reconnaissance effort since compromise or premature disclosure of this endeavor could result in serious national embarrassment and possible subsequent loss in the operational utility of the system and the resulting intelligence. For example, the very fact that the USAF has an approved satellite program is, in itself, classified as SECRET information.

/s/ O. J. Ritland
O. J. RITLAND
Colonel, USAF
Commander

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COPY

THE RAMO [redacted] DGE CORPORATION
LOS ANGELES 45, CALIFORNIA
INTEROFFICE CORRESPONDENCE

TO: Col. O. J. Ritland

CC: Col. C. H. Terhune
Lt. Col. F. C. Oder
L. G. Dunn
J. C. Fletcher

DATE: 11 Oct. 56

SUBJECT: R-W Responsibility
in WS 117L Program

FROM: Simon Ramo

REF: Letter from Col. O. J. Ritland to S. Ramo
dtd 9/7/56, Subject as above.

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1. The referenced letter is believed to make clear R-W's present responsibilities in this program and makes possible R-W planning as to organization and manpower assignments.

2. R-W desires to be an eligible competitor for certain hardware aspects of WS 117L; namely, in communications, computers, and specialized control subsystems, as well as in any form of electronics instrumentation for testing out the system in stationary facilities or in connection with flight testing. We should also like to be considered for any new developments that may be required in the field of tracking subsystems. We do not expect to be interested in airframe, propulsion, nuclear power supply, or stable platform aspects.

3. The amount of effort allowed to R-W during fiscal '57 is quite limited (six man years according to the referenced letter). It is desirable that this budget be spent as judiciously as possible on those aspects of the program which can be of greatest assistance to WDD in directing the program. We suggest that great care be exercised in the assignment of task to avoid any routine or minor engineering, engineering liaison, or data and record searching or listing functions, since these could probably be more easily obtained in other ways. We believe that the unusual technical staff assembled in R-W can be particularly useful if confined to the more difficult types of technical investigations, or on issues involving major system judgments and interactions with the ICBM program. For virtually any study, it is necessary to insure proper technical and program coordination of the conclusions by assignment of some part-time effort by our top directorial staff. Also, practically any technical investigation requires some competent technical staff assignment for such supporting purposes as computer programming, library research, and the like. When these items are added to the main analytical effort of those individuals assigned full time to a specific study, the year's budget of six man years could be quickly used up. It is thus necessary that R-W avoid any additional and unnecessary expenditures in administrative and managerial assignments relating to this program. Accordingly, some changes in our organizational structure relative to the handling of our work in this field are presently being made. Specifically, we have had in the past a "Program Director's Office" similar to what has been set up for the 65, 68, and 75 programs. The previously contemplated

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assignment of individuals to sush a Program Office to handle a technical-executive role seems now unwarranted in view of the small amount of effort expected from R-W, and especially in view of the fact that this effort must come from the most highly technically specialized experts in the Company. We are accordingly abolishing this special program director's office, and instead setting up a special assistant to Dr. Dunn, the Director of the Guided Missile Research Division. This assistant will be responsible for liaison with your office and for arranging the assignment to the appropriate specialists of the specific tasks which you call upon R-W to carry out.

4. This special assistant will be Mr. F. A. Ford. Mr. Ford is an experienced scientist and engineer with over 20 years of pertinent background. He has held responsible positions in frontier problems at the RAND Corporation, then in charge of preliminary missile design work at North American Aviation, and later as Deputy Chief Engineer of Northrop. In the latter capacity, Mr. Ford was in charge of a large part of Northrop's entire engineering effort, including their advanced projects, their guided missile projects, and their research and operational studies. His experience and background with us has confirmed that he is an appropriate person to handle well the direct liaison with Wol. Oder's office, and the direct arrangements, as an assistant to Dr. Dunn, necessary with the various technical staffs of R-W who will actually perform the studies. Dr. Fletcher, who on a part time basis has been heading the previous Program Director's Office, with Ford as his assistant, will confine now his attentions to the directing of the Electronics Staff. In that capacity we feel that he will be used to the greater advantage of all of WDD's programs, including WS 117L.

5. Should WS 117L develop in such a way that the R-W role is altered, we shall, of course, be ready at any time to make appropriate organizational changes so as to meet our contractual obligations.

Original Signed
Simon Ramo

SR:rm

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THE RAMO-WOOLDRIDGE CORPORATION [illegible] 10 - 55

LOS ANGELES 45, CALIFORNIA

INTEROFFICE CORRESPONDENCE

TO: Maj. Gen. B. A. Schriever

CC: Brig. Gen. B. I. Funk
Col. H. T. Morris
Col. O. J. Ritland
Col. C. H. Terhune
L. G. Dunn
F. W. Hesse

DATE: July 25, 1956

SUBJECT: Role of R-W in Research and in Experimental Work on Contract 1190

FROM: Simon Ramo

Reference: Memo to Dr. Ramo from General Schriever, same subject
18 July 1956

1. Your memo referenced above appears to be an adequate statement of the current policy contemplated by WDD in conjunction with R-W's role in research and experimental work on Contract 1190, and removes previous misunderstandings, with the exception of the three items discussed below.

2. Your memorandum introduces the word "experimentation" and outlines the procedure which you would like to have followed in connection with R-W's obtaining approval to carry on research and experimentation under Contract 1190. It is not clear whether these words apply to both new and continuing studies in existing laboratories; as two examples, we might consider the work which has been carried on in our so-called Analog Computer Laboratory during the past year or two, and the work which will be done in the Data Reduction and Analysis Center. In such cases we clearly are doing laboratory work in pursuit of our technical evaluations and systems engineering assignment, and it has certainly not been our practice to call out each specific study task ahead of time and to obtain prior approval to carry it out. To subject each new study in existing laboratories to the prior approval technique would obviously constitute a major deterrent toward completing our analyses in a timely fashion and a major departure from what has been the practice.

In view of previous approvals which made possible such facilities, and the complete awareness by WDD of the precise way in which these studies are carried out in our laboratories, we are assuming that your memorandum in the use of the words "research and experimentation" is not intended to apply to these tasks. Accordingly, unless you should indicate by further elaboration of your memo that we have the wrong interpretation, we shall assume henceforth that once the Air Force has officially determined that the Program requires the establishment of a given laboratory operation and facility of a particular scope for a defined purpose, it will not be necessary for formal review to be made of the individual studies and investigations which would constitute the day-to-day operation of the laboratory.

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[redacted]

3. Paragraph 6 of your memorandum suggests a policy that any research or experimental work which will exceed a $5,000 total expenditure or $500 worth of special equipment, or three man-months of effort should receive prior proposals by R-W and prior approval before proceeding. At the same time, your memorandum indicates that it is not your intention to restrict R-W accomplishments under 1190 in the role of research and experimentation, and that R-W will be given the same consideration on such experimental work as other potential sources.

I submit that a realistic consideration of the limitations imposed by this suggested policy are such as to preclude for all practical purposes our carrying on such preliminary experimental investigations. Any experimental investigation undertaken by R-W has so strong a chance of exceeding either three man-months, or $5,000 total expenditure, and/or requiring $500 in special equipment, that to guard against being in violation of the contract I would certainly have to issue instructions that no such investigation be started without going through the prior justification and proposal route.

These statements are not to be construed as indicative of the fact that R-W feels that it requires a complete free hand to do whatever laboratory work it deems necessary, with whatever amount of charging of special equipment to the contract it believes to be required for a specific experimental task. Rather, it is my point that the proposed limitations are set so stringently as to handicap our best efforts. I agree that some kind of prior approval mechanism is both necessary and desirable, and that we should work together to prepare a joint instruction setting forth a reasonable framework for Air Force review, R-W accomplishment and reporting of such research and experimentation.

In attempting to set a limit on the amount of such tasks, the preferable (and conventional) method used is to cover such tasks in general terms in the work statement, to estimate their total scope and cost for the contract period, and not require individual prior approval on specific expenditures within that estimate. If, however, this is not acceptable, R-W is willing to consider an alternative approach which would be limiting but not constrictive; namely, a method of control as a substitute for prior approvals of individual tasks. Note that on purely non-laboratory study efforts, we could not operate if individual prior approvals were required before each task (and we have, therefore, never attempted such a procedure). The chief difference when laboratory work is considered and hence the issue of control here would appear to be the amount of special equipment which is purchased and charged directly to the contract, rather than the charging of manpower.

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In management terms, the privilege of properly charging to a contract, once a statement of work has been agreed upon is certainly of the most fundamental nature and is completely established both on this and other contracts as a necessary prerogative of the contractor's technical judgment in order to carry out the work to which he has committed himself. The director of a program such as this must have freedom of choice in the day-to-day direction of the efforts of his research team. If you agree with these remarks, then it seems to me that the practical technique for control of laboratory work is by prior approval of the special equipment.

Repeating the above recommendation for clarity, I would suggest that you allow R-W complete freedom to perform laboratory work on Contract 1190 without prior approval, so long as the individual task does not require new equipment involving more than $10,000 in cost to be charged directly to the contract. If there is a concern that there may be too large a number of special tasks, as compared with an estimate made at the beginning of the contract period, then you could set a further limitation; namely, that without prior approval during the contract period there can be no more than a total of $100,000 of equipment to be charged to the contract which does not have special additional prior approval before the expenditure.

4. Finally, I would propose that we make a clear distinction between the policy and procedure applying to (a) experimental work directed toward achieving a suitable weapon at the earliest possible time, versus (b) research, whether theoretical or experimental, directed toward advancing the state of the ballistic missile art. In case (a), Paragraph 3 would apply. In case (b), a completely detailed prior approval mechanism is acceptable because there is not the same danger of impeding progress toward operational capability. Therefore, I suggest a separate joint procedure on this latter subject, which would indeed call for individual task approval prior to our undertaking any investigation whether theoretical or experimental, whenever such work would exceed two man-months or require any special equipment whatsoever.

5. As mentioned in my earlier memo of April 16, we expect that WDD and AMC will be guided by their usual policies in judging what facility items the contractors should be expected to own and what items are to be regarded as special for the particular project. I believe that it is proper for R-W to furnish experimental general purpose laboratory equipment of the type and in quantities which will probably be of continuing use to the Company in its normal electronics business. Where the nature of the equipment is peculiar to the work under Contract 1190 as to type or as to quantity, it seems proper for the Air Force to furnish it, either as a direct charge to the contract or under the existing facilities contract. I believe this philosophy

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is consistent with Air Force policy.

6. Your early consideration of the specific policies outlined in Paragraphs 3 and 4 above is solicited since such policies are pertinent to the definitizing of the contract which we, WDD, and AMC are now attempting to complete at the earliest possible date.

Simon Ramo

SR:rm

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[redacted]

JUL 23 1956

SUBJECT: WS 117L Procedures

TO: Ramo-Wooldridge Corporation
Attn: Dr. L. G. Dunn

1. Reference is made to Ramo-Wooldridge Corporation letter of 15 July 1956 on the subject of WS 117L procedures. In transmitting reports and other information generated by one government contractor to another, the Air Force endeavors to protect the legitimate proprietary interests of such contractor and avoid giving one firm an unfair advantage over another. Subject to this and any specific contractual limitation, the government always reserves the right to use information gathered on government contract as it sees fit. Therefore, the Western Development Division cannot subject its decisions on dissemination of such information to approval by any contractor.

2. The Western Development Division will make arrangements within its own organization to insure that information it may transmit from Ramo-Wooldridge Corporation to WS 117L contractors, with respect to the WS 107A or WS 315A programs, is in conformance with overall Western Development plans and policies, unless the information is forwarded with appropriate qualifications.

3. The Western Development Division will not forward to other contractors any Ramo-Wooldridge Corporation internal memoranda or other informal information relative to WS 117L without specific concurrence of the Ramo-Wooldridge Corporation WS 117L Program Director or any other person that the Ramo-Wooldridge Corporation may designate. Conversely however, the Western Development Division will assume that any communication transmitted officially from Ramo-Wooldridge Corporation to Western Development Division is factual and consistent with Ramo-Wooldridge Corporation policies and plans. How the Ramo-Wooldridge Corporation insures that its outgoing correspondence meets these conditions is a matter for its own internal administration. The Western Development Division will cooperate with the Ramo-Wooldridge Corporation in any procedure the latter chooses to adopt.

WDTR DH

R.C. TRUAX 236

4. With respect to procedures for meetings and visits, minutes of meetings and incoming reports, the Western Development Division concurs with the recommendations of referenced letter.

SIGNED
HAROLD W. NORTON
Colonel, USAF
Assistant Deputy Commander
Technical Operations

WDTR
R.C. TRUAX

DH

[redacted]

[redacted]

ROUGH DRAFT
SR/rm/3-16-56

Suggested Draft ltr Ramo 'did'

see memo for col [illegible] from WDTR 26 mar 56 same subject

TO: Dr. Ramo

SUBJ: R-W Responsibility in the ARS Program

FROM: General B. A. Schriever

1. For some time the obligation undertaken by R-W on behalf of WDD has included certain tasks in connection with the USAF Satellite program. The purpose of this letter is to define further the specific future duties seen for The Ramo-Wooldridge Corporation in this area. The following guidance is regarded as sufficient to enable continued planning by your company to provide these services, and to make the estimates necessary for budgeting and contractual arrangements to cover such tasks.

2. In general, the ARS program covers a broad system development, including activities at a number of centers of ARDC and a number of contractors. A part of this program involves very close interaction with the ICBM program. Also, it is important that the ARS program be carried out with minimum interference to the ICBM program and maximum mutual support between the two programs. Accordingly, it will be necessary to organize for the management of that portion of the ARS program that interacts closely with the ICBM in a manner somewhat different from the detailed organization required for the rest of the total ARS program.

3. More specifically, the first phase of the ARS program from the vehicle standpoint will involve, as you already know, the design of an orbiting powered nose cone to be launched from a standard ICBM "understructure." This phase of the program will have a twofold objective: (a) as a first step in the total ARS vehicle program, it will provide initial orbiting experience, and (b) it will serve as a backup for the International Geophysical Year Satellite Program. In order to meet the scheduled dates and to insure a minimum of potential interference to the ICBM program, this portion of the program will be handled in precisely the same manner as applies to the ICBM program. That is, a separate contract or contracts will be issued to industry to provide the orbiting test vehicle, with The Ramo-Wooldridge Corporation furnishing technical direction over the contractors, including the supervision of the integration of this orbiting, powered nose cone with the Convair ICBM vehicle and the launchings at AFMTC. While the technical direction clause in the contract and the technical direction procedures being used by WDD/R-W will apply, the words "systems engineering responsibility" will obviously not apply because this phase of the total ARS program does not involve a complete systems operation. It will, however, be

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the responsibility of The Ramo-Wooldridge Corporation to assure that all aspects of the planning and execution of this phase of the ARS program is done with technical soundness. In short, all matters connected with this specific first phase of the ARS program will be handled by the normal procedures for the setting up of R&D plans and schedules, work statements, technical direction meetings, etc., that are used on the ICBM and IRBM programs.

4. The total ARS program involves the application of the vehicle to a complete intelligence and reconnaissance system using satellites, with the corollary development of airborne and ground based equipment for sensing, communication, data handling, control, etc. WDD will establish a project office for the supervision of this total ARS program. In this connection, R-W's GMRD will be expected to act as a technical staff. This staff will not have systems responsibility, nor will it direct the technical activities of all the contractors of the program. However, the staff must be of such size and nature that it can provide to the WDD project office the following specific services:

a. System analyses of the operation of the complete system to a sufficient extent to advise intelligently on compatibility of military requirements, objectives, and state of the technical art.

b. Study and advice in the creation of an over-all R&D plan.

c. Technical evaluation of proposals.

d. Study and criticism of technical work statements in contracts.

e. Study and criticism of technical reports.

f. Aid in cost estimating for technical apparatus of the complete system.

g. Operational research studies.

21 Mar 56

Col T

I am happy to agree with the general. I recommend this as the best solution.

WESTERN DEVELOPMENT DIVISION
HEADQUARTERS AIR RESEARCH AND DEVELOPMENT COMMAND
P. O. Box 262
Inglewood, California

DATE 19 Mar 1956

MEMORANDUM FOR: Col Terhune:

This is essentially what I have in mind re-R&W role in ARS.

Pls. look it over and give me your comments or concurrence - If latter prepare letter for my sig. to R&W.

B. A. SCHRIEVER
Brigadier General, USAF
Commander

[redacted]

THE RAMO-WOOLDRIDGE CORPORATION
LOS ANGELES 45, CALIFORNIA

INTEROFFICE CORRESPONDENCE

TO: General B. A. Schriever

CC: Col. C. H. Terhune
L. G. Dunn
J. C. Fletcher
F. W. Hesse
R. F. Mettler

DATE: March 16, 1956

SUBJECT R-W Responsibility in the ARS Program

FROM: Simon Ramo

I believe that it is necessary that R-W receive from you some additional definition on the above subject for several reasons. As an indication of what I believe to be needed, I have dictated the attached rough draft of a letter that I would appreciate your looking over. If this document or one something like it should be somewhere near your own thinking on this subject, then I think it would be very helpful for R-W to receive it at an early date.

S. R.
Simon Ramo

SR:rm

Attachment

[redacted] [redacted]

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Cy 1 of 9
Pg 1 of 3

THE RAMO-WOOLDRIDGE CORPORATION
LOS ANGELES 45, CALIFORNIA
INTEROFFICE CORRESPONDENCE

TO: General B. A. Schriever

CC: Col. C. H. Terhune
Col. H. W. Norton
L. G. Dunn
B. D. Fried
R. F. Mettler
A. K. Thiel

DATE: November 22, 1955

SUBJECT ARS Program

FROM: Simon Ramo

The following is a summary of R-W thinking on the above program written on the assumption that WDD is to take over responsibility for conduct of this program permanently, and that the problems before us include: (a) choice of date and extent to which WDD takes control from WADC where it is now centered, and (b) the early actions which should be taken by WDD when such control is accepted.

R-W thinking is based on the following major concepts:

1. The ARS program should be prosecuted vigorously but must not interfere with either ICBM or MRBM early capability.
2. First ARS satellite launchings should be confined to use of the then available ICBM vehicles, with only the substitution of a new powered satellite orbiting nose cone for the ICBM instrumented re-entry nose cone.
3. The many detailed subsystem techniques peculiar to a good intelligence and reconnaissance satellite, namely, data sensing equipment, data storage equipment, long life satellite-borne power supply, intelligence data handling equipment, communication links, and virtually all other apsects of the system, require substantial state of the art development. Equally important, the optimum combination of these techniques into a versatile intelligence and reconnaissance satellite represents a major systems engineering job, which it is premature to do at this time, without further development of the subsystem techniques.
4. This does not preclude having a highly limited intelligence or reconnaissance satellite as an early first step.

With the above general concepts in mind, we note that the present program on ARS can be conveniently divided into two aspects. One part of the program is a series of tasks on subsystem, component, or technique state of the art development. These include some dozen relatively small study and

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hardware experimentations on orbiting attitude control, nuclear power supply, radio spectrum sensing, optical pick-ups, communication, etc. The other work presently being sponsored consists of three systems planning projects.

It would be our strong recommendation that the first action that is needed, and this should be taken as soon as possible, is to announce continuation of the first set of tasks on component state of the art development, and simultaneously to drastically alter the tasks of the second group conducting systems studies. This group has been asked to prepare a complete R&D plan for a sophisticated and major satellite system, a task which is considered to be premature, and which requires for its carrying out that the three contractor teams seek a great deal of information from ICBM contractors--a substantial interference to the ICBM project.

The redirection of these studies should, we believe, be as follows. They should be given by WDD/R-W a brief and succinct description of the ICBM vehicle below the nose cone and told to eliminate completely from their studies any other investigations of this vehicle understructure, boost, and trajectory. They then should be asked to prepare preliminary designs of a powered nose cone to be available for launching in the latter half of 1958 on present ICBM understructures and boost-trajectory. The purpose of this first series of flights would be merely to obtain orbiting experience, These first nose cones would contain an absolute minimum of instrumentation, except that associated with the control and tracking of the satellite to assure proper orbiting. The general weight of nose cone would be in the region of, say, three to ten thousand pounds and their studies would, of course, cover the complete package, including the additional rocket power and path control into the orbit, attitude control of the nose cone after reaching orbit, and the satellite-borne portion of the tracking instrumentation.

An additional task these three contractors should be asked to consider is what should be done as the next phase to alter the nature and complexity of the instrumentation carried in the satellite to where it has some minimum usefulness for reconnaissance or intelligence purposes.

Attacked in this way, the satellite program assures the development of techniques that will ultimately make possible the design of more sophisticated and versatile satellite systems. It will give the earliest possible flying experience (even conceivably making possible a backup for the IGY satellite if required), and probably even making possible the earliest possible attainment of some minimum militarily useful satellite.

To implement this program with the greatest of clarity and direction, while assuring the least assignment to WDD of what could be carried by others, it is recommended that WDD take control only of the systems study programs and immediately effect this redirection, leaving the component development program under its present management for the time being. This latter program should, however, come under increasing scrutiny by WDD/R-W because it may require substantial later modifications or extensions, and the background to effect these should be sought as early as possible.

Simon Ramo

(dictated but not read)

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WS 117L "Sensitive Aspects" Roster

WDSI WDTR DEC 28 1956
eh/1343

For your information, inclosed herewith is revised copy of WS 117L "Sensitive Aspects" Roster.

SIGNED

1 Incl
WS 117L "Sensitive Aspects"
Roster

FREDERIC C. E. ODER
Lt Colonel, USAF
Assistant for WS 117L
Technical Operations

20 Nov 56 **WS 117L "Sensitive Aspects" Roster**

1. The following personnel are listed as requiring complete knowledge of the "Sensitive Aspects" of WS 117L.

Western Development Division

a. Major General Bernard A. Schriever
b. Brigadier General Osmond J. Ritland
c. Colonel Charles H. Terhune, Jr.
d. Colonel Harold W. Norton
e. Colonel Robert D. Bowers
f. Colonel William A. Sheppard
g. Lt Colonel J. B. Hudson
h. Lt Colonel Frederic C. E. Oder
i. Commander Robert C. Truax
j. Lt Colonel Quenten A. Riepe
k. Major George E. Austin
l. Major Raymond E. Zelenka
m. Captain Edward J. Conway
n. Captain James S. Coolbaugh
o. Captain William O. Troetschel
p. 1/Lieutenant John C. Herther

Ballistic Missile Office (AMC)

a. Brigadier General B. I. Funk
b. Colonel H. T. Morris
c. Major R. G. Rowland
d. Mr. Eugene C. Silberman

Air Force Cambridge Research Center

a. Colonel J. G. Gillespie
b. Lt Colonel George P. Jones
c. Mr. Milton Greenberg

Wright Air Development Center

a. Brigidier General Victor H. Haugen
b. Mr. Leroy Bell

Rome Air Development Center

a. Major General S. P. Wright
b. Colonel James W. Anderson, Jr.
c. Lt Colonel Milton E. Wills
d. Major Harold F. Wienberg
e. Mr. Milton R. Rosenberg
f. Mr. Richard L. Libby

20 Nov 56

Headquarters - Air Research and Development Command

a. Lieutenant General Thomas S. Power
b. Brigadier General Kurt M. Landon
c. Brigadier General Don R. Ostrander
d. Brigadier General Marvin C. Demler
e. Lt Colonel Paul E. Worthman
f. Lt Colonel Victor M. Genez

4 Dec 56

Lockheed Aircraft Corporation - AF Plant Representative

a. Colonel Clifford E. Cole
b. Major Harold R. Meadows
c. Mr. John H. McLachlin

20 Nov 56 **WS 117L "Sensitive Aspects" Roster**

2. The following individuals are listed as requiring only that knowledge of the "Sensitive Aspects" of WS 117L as is necessary to provide proper planning support and formulation of appropriate technical recommendations to Western Development Division in the subsystem areas.

Western Development Division

a. Colonel William W. Leonhard
b. Lt Colonel Edwin A. Swanke
c. Major Samuel H. Schiavo
d. Lt Colonel Richard K. Jacobson
e. Major Prentice B. Peabody

Air Force Cambridge Research Center

a. Dr. Alan M. Gerlach

Wright Air Development Center

a. Captain Ralph S. Decker, Jr.
b. Captain Phillip J. Crossman
c. 1/Lieutenant William C. Covington
d. 1/Lieutenant Malcolm R. Malcomson
e. 2/Lieutenant John M. Nilles
f. Mr. James H. Huckaby
g. Mr. Luther H. Meuser
h. Mr. Charles J. Marshall
i. Mr. Donald L. Beam
j. Mr. Albert J. Falkowski

Rome Air Development Center

a. Major James Suttie
b. Major Byron L. Schatzley
c. Mr. Joseph Fallik
d. Mr. Russell H. Johnson
e. Mr. Seward F. Norris
f. Mr. Langine Waszkiewicz
g. Mr. Robert F. Samson
h. Mr. Daniel Loreto

[redacted]

[redacted]

WDTR DEC 28 1956

SUBJECT: (U) ARS Progress Report

TO: Commander
Air Force Cambridge Research Center
ATTN: CRZVA:820:4C, Mr. Radner
Cambridge, Massachusetts

1. Reference is made to your letter, same subject, 26 September 1956.

2. Inclosed is our exchange of correspondence with Missile System Division of the Lockheed Aircraft Corporation on this subject which indicates action to date.

3. We appreciate your catching the error in question as it could have serious consequences if left unchallenged.

4. Your comments on the applicability of the date attributed to Berg and Meredith, Naval Research Laboratory, are requested.

5. Please note that the calculations used by Missile System Division of the Lockheed Aircraft Corporation in their report MSD 1958 were made by Dr. George Taylor.

FOR THE COMMANDER:

SIGNED

FREDERIC C. E. ODER
Lt Colonel, USAF
Assistant for WS 117L
Technical Operations

3 Incl
- 1-ltr fr WDTR to LMSD
  30 Oct 56, 1 pg, 1 cy
  (WDTR 56-203) (S)
- 2-ltr fr LMSD 7 Dec 56
  1 pg, 1 cy
  (WD 56-05119) (S)
- 3-ltr fr WDTR to LMSD
  2 pgs, 1 cy
  (WDTR 56-273) (S)

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F C E Oder 1

WDTR 56-274

[redacted]

[redacted]

DEC 28 1956

WDTR

SUBJECT: (U) Pied Piper Progress Report for August, MSD 1958
dated 1 September 1956

TO:
Lockheed Aircraft Corporation
Missile System Division
ATTN: Mr. R. M. Salter, Jr.
Post Office Box 504
Sunnyvale, California

1. Reference is made to:

a. Our letter, same subject as above, dated 30 October 1956 (WDTR 56-208) (MSD/18503).

b. Your letter, 7 December 1956, MSD/18563.

2. In reference 1a, we called your attention to an error in calculation contained on page 5 of MSD 1958 which states "if the largest quoted value of 2.4 x 10^6 particles/cm^2/yr is assumed then about 130 of these particles will impinge upon the satellite during the exposure time of 0.01 seconds".

3. In reference 1b, you cite various data to support the use of quoted value (2.4 x 10^6 particles/cm^2/yr) of meteoric flux. This is not germane to the question raised in reference 1a.

4. A simple trial calculation (inclosure 1) indicates an error in concluding that the flux used results in "130 impacts during the 0.01 seconds of exposure time". Using the flux quoted in paragraphs 2 and 3 above, (from MSD 1958) the inclosure calculation gives impacts of the order of 10^{-2} impacts per second or 10^{-4} impacts during 0.01 seconds.

5. If the flux figure of 2 x 10^{-2} particles/cm^2/sec, quoted in paragraph 2, reference 1b, is used then, since the satellite has an external area of approximately 6 x 10^5 cm^2, an impact rate of 1.2 x 10^4 particles/satellite/second or 120 particles/satellite/0.01 sec would result, which agrees with the 130 particles per 0.01 second figure given in MSD 1958. The value of flux of 2 x 10^{-2} particles/

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cm^2/sec attributed to Berg and Meredith in paragraph 2 of reference 1b would be larger than the MSD 1958 value of 2.4 x 10^0 particles/cm^2/year by a factor of over 10^5. Since this office does not yet have access to the results attributed to Berg and Meredith, we cannot assess their applicability.

6. Since, as is stated in MSD 1958, an impact rate of 130 particles per 0.01 seconds could conceivably impart an angular oscillation to the camera in the neighborhood of the tolerance value of 0.00164 milliradians, it is essential that the best available figures of meteoric flux be accurately evaluated and their effect calculated in order that the camera and other components be adequately designed. This initial design cannot await the action indicated in paragraph 3 of reference 1b, although the instrumentation of early satellites should provide data for redesign, should the latter be necessary.

7. Please advise this office of the design data to be employed in this regard.

SIGNED

1 Incl
Trial Calculation
1 pg, 1 cy (S)
(WDTR 56-273)

FREDERIC C. E. ODER
Lt Colonel, USAF
Assistant for WS 117L
Technical Operations

Copy furnished:
AFCRC, CRZVA:820:4C, Mr. Radner

This document contains information affecting the National Defense of the United States within the meaning of the Espionage Law, Title 18, U.S.C., Section 793 and 794. Its transmission or the revelation of its contents in any manner to an unauthorized person is prohibited by law.

WDTR
F C E Oder

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[redacted]

[redacted]

Trial Calculation

1. Assume a cylindrical satellite vehicle 7 feet in diameter (d) by 30 feet long (l). (A generous approximation).

Area of satellite cylinder $= \pi d l$
$= \pi (7 \times 12 \times 2.54)(30 \times 12 \times 2.54)\ \text{cm}^2$
$= 6.15 \times 10^5\ \text{cm}^2$

2. One year = 365 x 24 x 60 x 60 seconds = 3.16×10^7 sec

3. 2.4×10^0 particles $\text{cm}^{-2}\ \text{yr}^{-1}$ (MSD 1958 value)

$$= \frac{2.4 \times 6.15 \times 10^5}{3.16 \times 10^7}\ \text{particles} \cdot \text{satellite}^{-1} \cdot \text{sec}^{-1}$$

$$= 4.7 \times 10^{-2}\ \text{particles} \cdot \text{satellite}^{-1} \cdot \text{sec}^{-1}$$

or of the order of 10^{-4} particles impacting on the satellite during an exposure of 0.01 sec.

This document contains information affecting the National Defense of the United States within the meaning of the Espionage Law, Title 18, U.S.C., Section 793 and 794. Its transmission or the revelation of its contents in any manner to an unauthorized person is prohibited by law.

[redacted]

Incl 1

[redacted]

[redacted]

WS 117L Vehicle Height on Launch Stand

WDI WDTR DEC 26 1956
ATTN: Lt Col V. L. Hastings J. S. Coolbaugh/ls/1344

1. The following values represent a summation of current booster and WS 117L lengths:

a. SM-65 and WS 117L - 96 feet

b. SM-68 and WS 117L - 112 feet

In both cases, the WS 117L vehicle was assumed to have a length of 24½ feet, a diameter of 61 inches and a nose cone with a 30 degree included angle.

2. The above numbers do not include any factors to account for possible future design changes or required clearances between the vehicle and launcher superstructure. A good assumption for possible variations in length due to redesign of the WS 117L vehicle is to use 30 feet as the maximum length. This, then, means that the SM-68 booster and WS 117L combined length would be 117½ feet. To allow for possible variations in the SM-68 booster design, this number should be rounded off to 125 feet.

3. Better values for the vehicle lengths will be made available to WDI as they become known.

SIGNED
FREDERIC C. E. ODER
Lt Colonel, USAF
Assistant for WS 117L
Technical Operations

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WDTR 56-271

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J S Coolbaugh 1[redacted]

21 Dec 1956

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TO COM WDD INGLEWOOD CALIF
BT
UNCLASS FROM AFDRD-SS 37326 REFERENCE IS MADE TO YOUR LETTER SUBJECT FUND REQUIREMENTS FOR WEAPON SYSTEM 117L PROGRAM DATED 21 NOV 1956. REQUEST THAT YOU REVIEW THE FUNDING INFORMATION PRESENTED IN EACH OF THE SUB-PARAGRAPHS OF PARAGRAPH 1 OF REFERENCED LETTER WITH A VIEW TOWARD DETERMINING IF ITEMS FOR WHICH P-200 FUNDS WERE RECOMMENDED MAY BE OBTAINED WITH P-100 FUNDS. ONE ELEMENT OF INFORMATION NEEDED IS A DETERMINATION OF WHICH ITEMS MAY BE PROCURED AS CFE FROM THE PRIME CONTRACTOR AS DISTINGUISHED FROM THOSE WHICH WILL BE PROCURED DIRECT BY THE AIR FORCE FROM OTHER CONTRACTORS TO BE GFE TO THE PRIME CONTRACTOR. REQUEST THAT YOUR RECOMMENDATIONS BE FORWARDED THIS HEADQUARTERS AS SOON AS POSSIBLE.
BT
21/1925Z DEC RJEPHQ

[redacted]

WDTLAR 13 December 1956

SUBJECT: Geophysical Information

TO: General Electric Company
Missile & Ordnance Systems Department
Aerophysics Laboratory
Attn: Mr. D. Vachon
3198 Chestnut Street
Philadelphia 4, Pennsylvania

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DOD DIR 5200.10

1. Reference your recent telephone conversation with Maj W. W. Ebelke, the items listed under Inclosures are forwarded herewith for your utilization and retention. (Uncl)

2. In using Item 1, you should keep in mind that the recommendations provided are tentative in many areas and therefore should not be acted upon without further analysis. A case in point is indicated in the margin of page 17. (Uncl)

3. With regard to your request for a duplicate set of the WDD-1A wind soundings provided R-W in April 1955 (by Air Weather Service through Mr. N. Sissenwine of AFCRC), it is suggested that you visit WDD/R-W to determine whether you need all of the IBM cards involved (estimated at about 10,000) for your CPE calculations. There appears to be some question as to how typical these soundings are of the areas they represent, and also as to their value at high levels because of the limited number of observations that extend to altitudes of interest. (Uncl)

4. For your information, these soundings were taken between 1953 and 1955 at the following locations:

AF Stations:	Portland, Oregon Selfridge AFB, Michigan Griffiss AFB, N.Y.
Weather Bureau Stations:	Great Falls, Montana Spokane, Washington Buffalo, N.Y.

They were provided to facilitate wind drift computations for two (2) probable target areas (45°N, 45°E and 55°N, 35°E). Since high altitude wind soundings were not available [redacted] target areas, it

[redacted]

WDTLAR ct
Maj Ebelke 1555

[redacted] [redacted]

was decided to use data for analogous wind regime areas where GMD-1 radar observing equipment was located. Item 9, "High Altitude Wind Comparisons", was prepared by AFCRC from "Upper Winds Over the World" by Brooks et al and indicates the best analogous areas. "The calmest area of the U. S. A., the Northwest, has a wind field with nearly the same average strength and deviations as the windiest target area, 45°N, 45°E. Consequently, both average drift and the contribution to the CEP when average drift is considered in aiming, should closely represent the target error and its distribution..... Average wind field strength analogous to the 55°N, 35°E target area cannot be found in the U. S. A. However, the distribution of vector deviations around the mean vector very closely approximates such deviations over the Great Lakes area" (extract from "Report on Activities of and Technical Information Provided by AFCRC geophysical Consultant" dated 4 March 1955). ~~(Secret)~~

5. The suggested visit would also enable you to discuss requirements you probably have for additional geophysics data (that may have already been provided by Mr. Sissenwine), and to coordinate with R-W personnel on the assumptions, correlations, etc. that are necessary in connection with utilization of same. For example, we understand that in your wind drift calculations you are using a sigma value of 4 as opposed to the value of 0.68 generally used; your reasons for this are not apparent to the R-W analysts and should be discussed with them. ~~(Confidential)~~

SIGNED

JOHN A. DODGE
Lt Colonel, USAF
Chief, Armament Group

9 Incls:

1. Summary of Information, Geophysical Discussions with AFCRC Consultants at WDD(ARDC), 5-9 Nov 56.
2. Tables and Graphs (Metric) of the ARDC Model Atmosphere, 1956 (Preliminary Edition).
3. Abbreviated English Tables of the ARDC Model Atmosphere, 1956.
4. Announcement of Committee on Extension to the Standard Atmosphere.
5. Graph, Synthetic Wind Speed Profiles for the Calmest Area of the U.S.
6. Graph, Synthetic Wind Speed Profiles for the Windiest Area of the U.S.
7. Graph, Derived Temperature vs Geometric Altitude.
8. Graph, Atmospheric Winds Between 30 & 80 Kms (from Signal Corps soundings and paper by W.C. Stroud in Journal of Geophysical Research).
9. High Altitude Wind Comparisons, Potential Target Areas and Analogous U.S [redacted]

[redacted]

ROUTINE X AF RDZGW-10-4-E UNCL

COMDR WDD, INGLEWOOD, CALIF

COMDR ARDC, BALTO

~~CONFIDENTIAL~~ FROM WDTR 10-4

FOR RDZGW RE YOUR TWX RDZGW-10-4-E PRESENTATION ON WS 117 WILL BE MADE AS REQUESTED IN YOUR TWX UNLESS ADVISED TO THE CONTRARY PD THIS WILL BE AT A TOP SECRET LEVEL AND WILL INCLUDE CERTAIN SENSTITIVE INFORMATION CONCERNING THE PROGRAM PD ACCORDINGLY CMM NECESSARY ARRANGEMENTS REGARDING NEED TO KNOW SHOULD BE MADE WITH DOD OH ~~EX~~ FOR ATTENDANCE AT THE PRESENTATION.IT IS PLANNED THAT THE PRESENTATION WILL BE MADE BY LT COL FREDERIC C.E. ODER PD IN ADDITION THE FOLLOWING NAMED WDD PERSONNEL WILL BE IN ATTENDANCE CLN CMDR TRUAX CMM AND LT COL QUENTEN A RIEPE PD ALL OF THE ABOVE NAMED OFFICERS ARE CLEARED TOP SECRET PD REQUEST THIS INFORMATION BE FURNISHED TO APPROPRIATE DOD OFFICE PD

DOWNGRADED AT 3 YEAR INTERVALS;
DECLASSIFIED AFTER 12 YEARS.
DOD DIR 5200.10

22 Oct
1956

WDTR

FREDERIC C. E. ODER, LT, COLONEL, USAF
1343 1 1

SIGNED

CHARLES H. TERHUNE, JR
COLONEL, USAF
DEPUTY COMMANDER
TECHNICAL OPERATIONS

~~CONFIDENTIAL~~ [redacted] D.H.

[redacted]

WDTLAR

14 December 1956

SUBJECT: Report on Geophysical Discussions with AFCRC Consultants, 5-9 Nov 1956

TO:
Avco Manufacturing Corporation
Research & Advanced Development Division
Attn: Mr. R. Eicles
20 South Union Street
Lawrence, Massachusetts

1. One (1) copy of subject report provided by Mr. N. Sissenwine of AFCRC is forwarded herewith for your information and retention.

2. It will be appreciated that some of the recommendations contained therein are tentative and subject to change as methods for treatment of atmospheric parameters are refined or new techniques introduced to compensate for data that are not available. There may also be a few conclusions that need further verification (e.g. see margin of page 17).

3. Much of the data referenced by Mr. Sissenwine is available at WDD/R-W; some has already been converted to the engineering form or correlations required for applicability to ICBM-IRBM problems. We therefore suggest that you arrange to visit us after you have had enough time to study this report in detail. This would enable you to obtain such additional data as you may require, and also to coordinate with R-W scientists on their treatment of the many assumptions, conclusions, etc., that are involved.

SIGNED

2 Incls.
1. Agenda
2. Report in Geophysical Discussions, 5-9 Nov 1956

JOHN A. DODGE
Lt. Colonel, USAF
Chief, Armament Group

CLASSIFICATION OF THIS DOCUMENT WDTLAR
WILL BE DOWN GRADED TO [illegible]
UPON REMOVAL OF ENCLOSURES

[redacted]

1555

9

R-W   18 December 1956
Dr. C. E. Solomon

Addition of Discussions on Geophysical Problems
to TD Meetings

WDTLAR
Maj Ebelke/ct/1555

1. Request that consideration be given to scheduling of quarterly technical sessions on geophysics problems in conjunction with TD meetings, beginning with the January 1957 sessions. Mr. N. Sissenwine, our AFCRC consultant on geophysical problems (possibly also Maj C. E. Jensen, AFCRC, Staff Weather Officer) should be asked to attend same.

2. It is further suggested that the discussion areas for these sessions be predetermined insofar as possible, and that the various other WDD/R-W groups (e.g. Engineering Mechanics) known to have related geophysics problems be invited to send limited representation to cover their particular interests.

3. These suggestions are based on the following conclusions (drawn from correspondence with AFCRC over the past several months and the many discussions held by various WDD/R-W groups with the visiting AFCRC geophysics consultant team over the period 5 to 9 November 1956):

a. Coordination with contractors on geophysical problems that have already received considerable internal WDD/R-W attention leaves much to be desired. Specifically, it appears that:

(1) Information, data and recommendations which AFCRC has provided are not always made available to contractors who also require same. As a result, AFCRC is the recipient of many complex inquiries of a repeat nature on the variations of such atmospheric parameters as pressure, temperature, relative humidity, wind density, shear, refractive index, etc.

(2) Statistical information which does get relayed to contractors is sometimes out of context. This may lead to erroneous design conclusions and unnecessarily expensive design features. A recent case in point - AVCO was advised that the following design criteria could be used as representative of extreme hot conditions in the U.S.:

Surface air temperature 125°F.
Surface wind 0 to 60 mph.

No qualification of the above was provided although the temperature of 125°F is considered applicable in the U.S. to Death Valley only - and even there it has a very limited expectancy. Furthermore, the concurrent wind speed experienced with such extremely high temperatures is only 5 to 10 mph. The duration of high temperatures should, of course, also be considered.

(3) AVCO, GE (and perhaps other contractors as well) appear to be going through about the same manipulations in connection with the conversion of raw data to the necessary form for application to specific ICBM problems. They are all concerned with the many inaccuracies associated with available climatological data, extrapolation of limited data to cover unknown areas, and the establishment of correlations of uncertain value. Many of these contractor analyses and calculations undoubtedly involve unnecessary duplication of effort; all of them must eventually be checked for validity of interpretation and utilization of data. Since the state of the art is not affected and proprietary considerations are not involved, the desireability of such independent operations is open to question. The same sources of climatological data and basic recommendations (i.e. AFCRC and Air Weather Service) are available to all, of course, but it is thought that the other contractors should be advised that R-W computations (e.g.on the effect of wind on dispersion) will be made periodically available as well as advanced R-W thinking on the proper treatment of atmospheric parameters and their deviations in the establishment of structural, thermal and other essential design criteria. This would militate against the use of data out of proper design or operational context; it would also make it unnecessary for other contractors to obtain large duplicate collections of punch card data for independent processing and costly time consuming computations.

b. Coordination within WDD/R-W on geophysics problems could also be much improved. Extensive personal contacts were made to obtain reasonable assurance that all geophysics problems of importance would be discussed with the AFCRC consultants during their recent visit; many of these contacts were ignorant of the liaison role played by WDTLAR in the geophysics area, had no knowledge of the voluminous collection of data and recommendations on specific meteorological problems to be found in WDTLAR files, and were unaware of the overlap of their own particular problems with those of other WDD/R-W groups.

c. Contacts with the AFCRC consultants should be more frequent than in the past and should include representation by other contractors to insure continuous and effective integration of effort on geophysics problems.

4. The complexity of meteorological problems is often difficult to recognize without considerable experience in meteorology and the knowledge thereby acquired of the inherent limitations and meaningfulness of available data. It is easy for the inexperienced analyst to either oversimplify the problem or to arrive at excessively conservative, naive or unrealistic correlations. Across the board coordination on meteorological and other geophysics problems through scheduled TD meetings as suggested should prevent further misinterpretation or misapplication of basic data and expedite progress towards our objectives.

5. One (1) copy of the report on the 5 - 9 November visit by the AFCRC people has been forwarded to both AVCO and GE to establish a common level of knowledge as to assistance that has been provided to date on geophysical problems. Review of this report by the contractor personnel involved (believed to be Vachon of GE and Ricles of AVCO should lead to early elucidation of the areas that need the kind of open discussion proposed.

JOHN A. DODGE
Lt Colonel, USAF
Chief, Armament Group

[redacted] [redacted]

WDTC 17 December 1956

MEMORANDUM FOR GENERAL RITLAND

SUBJECT: WS-117L Planning

1. After hearing the presentation by the 117L Program Office last Saturday, I am concerned that there may be less than a desirable amount of coordination between their plans and our present situation. I thought it would be well to provide you with some gross comments along this line.

2. First is their requirement for boosters. While it is quite true that the SM-65 program finds itself with a greater number of boosters than we now plan to use, the main reason that these are excess is our inability to efficiently and profitably complete and use them. Accordingly, we are in the midst of a planning exercise right now to reduce our production program, essentially eliminating all spare hardware. It is true that even so three standby Series "A" missiles will remain. Planning of this, however, is very dangerous since they are very early missiles and quite possibly will be required to fulfill their role as standbys during the SM-65 test program.

WDTX

3. For some time now we have continued to carry on our production charts four Series "C" missiles above and beyond the requirements for the SM-65. These are indicated on the control room charts as being unassigned, although during our recent Washington briefing they were included in the Flight Test Program. At Colonel Terhune's direction these were not eliminated in order that some cushion may exist for the 117L program. We are rapidly approaching the point where we should firmly assign these missiles or cancel them.

4. Colonel Oder indicated that their orbiting vehicle would weigh 9300 pounds and that a structural analysis of the 65 indicated that this was satisfactory. While this may be true for the present configuration, a TD is today being issued which will authorize Convair to reduce skin gauges and hence structural strength to a minimum consistent with the SM-65 requirements. This change is imperative for range considerations but will seriously decrease the capability of the missile to support a 9300-pound pay load.

5. Although I do not understand it in detail, Colonel Oder mentioned the use of AC Guidance rather than GE Guidance for missiles

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used by them. On the surface this sounds quite simple; but with the inevitable increased engineering and modification loads, I do not see how we can afford this very early in the program.

6. Perhaps the greatest conflict occurs in the facilities area both at Patrick and at Camp Cooke. The planning we are presently doing is in practically all cases limited by facilities and the need for modification thereof as we change series or tests within series. To consider additional wholesale modifications, much less diversion to another program during the critical phases of the Flight Test Program, is impossible. At Camp Cooke I will only point out that to follow the plan presented Saturday would vitiate our statements that we in fact have an initial operational capability and would seriously degrade our training programs.

7. Summarized, the problem looks to me as follows: The 107A-1 Program is in a state of potential slippage for a variety of reasons—component deliveries, subsystem deliveries, engineering time, facilities, and funds. We are continually striving to meet our critical dates despite these difficulties. To do so requires unloading the contractors in less essential areas and above all to maintain considerable flexibility as new difficulties are discovered. Although I recognize the dilemma facing the 117L program, it is my considered judgment that to attempt the test plan outlined by them Saturday would so disrupt both programs that neither could be completed within anything approximating the present time scales. Without meaning to be a "dog in the manger" I strongly urge that no hardware be planned for diversion to the 117L program prior to mid-1958 and that no flights using SM-65 hardware be contemplated prior to January 1959.

SIGNED
OTTO J. GLASSER
Colonel, USAF
Assistant for WS-107A-1

[redacted]

WDTC mt (17 Dec 56)
Col Glasser 2455

[redacted]

[redacted]

DEC 14 1956

WDTR

SUBJECT: Meeting of Technical Advisors to WS 117L

TO: Commander
Wright Air Development Center
ATTN: WCLOT-3, Mr. A. Bell
Wright-Patterson Air Force Base, Ohio

1. The WS 117L WSPO is required to prepare and submit, by the indicated dates, the following items:

a. 1 February 1957

A definitive statement of work for the contract with Lockheed's Missile System Division.

b. 5 February 1957

An itemized bill of materials for all subsystems.

c. 2 April 1957

A revised WDD Development Plan WS 117L.

2. In order to meet the above schedule and incur the least inconvenience on the part of attending individuals, all three of the above items will be considered in a meeting held at WDD during the third and fourth weeks of January 1957. A more detailed schedule of events is as follows:

a. 14 January 1957

Individuals from the ARDC Centers begin to convene at WDD.

b. 15 January 1957

The Missile System Division of Lockheed will submit a proposed definitive statement of work.

c. 23 January 1957

The WS 117L WSPO and the Technical Advisory Group will have accomplished:

(1) A definitive statement of work to be used as the basis for ensuing discussions with Lockheed.

(2) A coordinated ARDCM 80-4 documentation.

(3) An itemized bill of materials for all subsystems, with particular emphasis on items of GFE which will require procurement action during late FY 57 or early FY 58.

d. 23 - 25 January 1957

The WS 117L WSPO and the Technical Advisory Group will meet with representatives of the Missile System Division of Lockheed to coordinate a mutually acceptable definitive statement of work for the entire WS 117L Program.

3. The Wright Air Development Center is requested to send representatives to this meeting at WDD, and the attending representatives should be those individuals who have been assigned the responsibility of providing technical guidance and assistance to WS 117L. Since there are so many areas assigned to WADC, a staggered schedule of visits is desired in some cases, therefore, the following people or their substitutes should attend as follows:

a. Mr. Donald Reynolds, WCRRH, 15 and 16 January
b. Captain Ralph B. Decker, Jr., WCLPN, 16 thru 23 January
c. Lieutenant John Milles or Lieutenant W. Kram, WCLRR, 17 thru 22 January
d. Mr. James H. Huckeby, WCLRW, 17 thru 23 January
e. Mr. Luther H. Meuser, WCLRR, 21 thru 22 January
f. 1/Lieutenant Carl E. Johnson, WCLP, 16 thru 18 January
g. 1/Lieutenant William C. Covington, WCLON, 16 thru 23 January
h. 1/Lieutenant Malcolm R. Malcomson, WCLCE, 16 thru 23 January

The other representatives should attend during the period of 15 to 18 January, and Mr. A. L. Bell should plan on being present during the period of 15 thru 25 January.

4. Security clearances and requests for hotel accommodations should be forwarded to Western Development Division, ATTN: WDSIR, no later than 7 January 1957.

[redacted]

Col [illegible]

MEMORANDUM FOR RECORD 12 December 1956

SUBJECT: Planning Schedule - WS 117L

1. Several items requiring concentrated planning action will occur during the next 4 months. These are:

a. The writing of a definitive Work Statement for LMSD for WS 117L.

b. The submission of the FY 58 budget requirement.

c. The revision of the 80-4 development plan for WS 117L.

d. The writing of Sub-system development plans for the Sub-system projects and two supporting projects.

e. Submission of GFE buying list by sub-system project. These lists should identify the items to be procured by Nomenclature, Stock number, quantity desired, need date, estimated lead time and point of delivery.

2. A schedule of events has been established and is presented as follows:

a. LMSD Report 2011 was distributed to the ARDC Center for review and comments on the adequacy of the proposed sub-system development plans. These sub-system plans were also to be considered as basic material for use as definitive work statements on the sub-system areas. The Center comments are to be returned to WDTR by 7 January 1957.

b. Mr. Silberman has requested LMSD to submit a proposed definitive work statement for the WS 117L Contract on or before 15 January 1957.

c. Members of ARDC Center consultant teams should be named, and visit request letters sent to them to convene these groups at WDD on 14 January 1957. The purpose of these groups should be to coordinate a definitive work statement for the system and sub-systems and to coordinate the 80-4, 613's for the sub-system development plans. This work should be completed by 23 January 1957.

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d. On 23 - 25 January 1957, this consultant group plus members of LMSD should meet to agree on a fully acceptable definitive statement of work for the entire WS 117L Program.

e. 1 February 1957. Submit definitive work statement to BMO to incorporate into the LMSD Contract.

f. Concurrently with this work, the project offices should be itemizing a bill of materials for their sub-systems--particular emphasis should be placed on those items of GFE that will require procurement action during late FY 57 or FY 58. Forms have been prepared by WDTRP for this task. This material will be submitted by 5 February 1957.

g. Sub-system development plans should fall out of the definitive contract meetings and the basic material necessary for the submission of Project 613's. This material and the revised WDD Development Plan WS 117L will be submitted by 2 April 1957.

QUENTIN A. RIEPE
Lt Colonel, USAF
WS 117L Project Office
Technical Operations

[redacted] [redacted]

(U) Purchase Request, Massachusetts Institute of Technology

MCPTS
Mr. Gene Silberman

WDTR

DEC 10 1956
J. C. Herther/ls/1343

1. Exhibit "A" of the Statement of Work on Purchase Request #57-WDD-214 dated 27 November 1956 will be changed in accordance with the following instructions:

a. Item I and II will be deleted and the attached inclosure #1 will be substituted in lieu thereof.

b. The title of the inclosure of Item I.A., "Specifications for an Inertial Guidance and Orbital Attitude Control System for WS 117L", will be changed to "WS 117L Guidance and Control Subsystem Development Plan (TECHNICAL APPROACH)".

c. Item III: Reports, will be changed as follows:

(1) On page 2, the number of copies of reports shall be broken down in three columns; total number of copies, total number of copies for the Air Force, and the total to Lockheed Aircraft Corporation. The total number of copies shall remain the same. The number of copies to the Air Force shall be, in order listed on page 2 where a total number is shown, I. 5, 3, II. 5, 3, III. 3, 3, 3, 5. The number of copies to Lockheed Aircraft Corporation shall be I. 5, 2, II. 5, 2, III. 2, 2, 2, 5.

(2) On page 2, under III Film Report, delete "As required" and "As stated" and substitute "Not applicable".

(3) On page 2, delete "and Film Reports" and add the following address for the reports to be sent to Lockheed: Missile System Division, Lockheed Aircraft Corporation, ATTN: J. H. Carter, P. O. Box 504, Sunnyvale, California.

(4) On page 3, delete the paragraph on film reports.

(5) On page 3, I.A.1., change to read: "As of Date: Unless otherwise specified, close of the 15th day of each month".

(6) On page 3, I.A.2, delete "15th" and substitute "1st".

(7) On page 4, I.A.4.b, delete "Last working" and substitute "the 15th".

(8) On page 6, I.B.1 & 2, use instructions 5 & 6 above.

(9) On page 11, II.A.1, delete "last working" and substitute the "15th".

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(10) On page 12, II.B.1., delete "30 June and 31 December" and substitute "15 June and 15 December".

(11) On page 12, II.B.2., delete "15th" and substitute "1st".

(12) On page 13, II.B.4.b.(2)(a), delete "end" and substitute "15th".

(13) On page 13, II.B.4.b.(2)(b), add "or other launch site".

(14) On page 16, III.C.1, delete "30th" and substitute "15th".

(15) On page 16, III.C.2., delete "15th" and substitute "1st".

(16) Delete all information in Item III.F., as it is not applicable on pages 18, 19, 20 and 21, down to III.G.

d. On page 31, IV A., delete "at a minimum" in the last sentence of this paragraph.

2. Please furnish WDTR with 10 copies of the final contractual document.

SIGNED

FREDERIC C. E. ODER
Lt Colonel, USAF
Assistant for WS 117L
Technical Operations

1 Incl
EXHIBIT "A", Statement of Work
3 pgs, WDTR 56-235 (Rev 7 Dec 56)
3 cys

copy furnished to:
WDTO, Captain Johnston
w/ 1 Incl-EX "A", Statement of Work
WDTR 56-235 (Rev 7 Dec 56) 1 cy, 3 pg

When inclosures are withdrawn the classification of this correspondence will be down graded to Unclassified in accordance with AFR 205-1

[redacted] WDTR 56-256

WDTR
J C Herther [redacted] 1343

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EXHIBIT "A"

STATEMENT OF WORK

I. The Contractor shall conduct studies, research, development, furnish necessary personnel, facilities and materials as required to accomplish the task set forth below:

A. Program Objective

The objective of this program is the successful application of "all-inertial" navigation techniques and instrumentation to the guidance and control system of WS 117L, the Advanced Reconnaissance System. The Instrumentation Laboratory of the Massachusetts Institute of Technology shall develop and test a guidance and orbital attitude control subsystem which shall provide guidance and control signals for a satellite vehicle during all phases of flight, and shall become an integral part of the Weapon System. In carrying out the development of this system, maximum possible use will be made of existing hardware evolved by previously sponsored Government research and development programs and currently in production. The development shall be accomplished in accordance with inclosure 1, "WS 117L Guidance and Control Subsystem Development Plan (TECHNICAL APPROACH)".

B. Tasks

1. Perform over-all guidance and control system analysis to insure compatibility with the rest of the WS 117L System.

2. Study, investigate, develop and test equipment and techniques for the guidance and control of WS 117L. Develop, design, fabricate, assemble, bench-test and participate in the early WS 117L flight-test program, and evaluate experimental and developmental components and systems to achieve the above objective.

C. The tasks, as described in paragraph (B) above, shall be performed on the Ascent Guidance System, consisting of three phases:

1. Booster Powered Phase
2. Coast Phase
3. Orbital Powered Phase

and the Orbital Attitude Stabilization System, as described in the attached "WS 117L Guidance and Control Subsystem Development Plan (TECHNICAL APPROACH)".

[redacted]

WDTR 56-235
(Rev 7 Dec 56)

Incl. 1

[redacted]

D. In order to provide suitable equipment to meet the WS 117L flight test requirements, the work on the Ascent Guidance System and the Orbital Attitude Control System will be divided in the following manner:

1. Systems for meeting minimum requirement

a. Ascent Guidance - Modification and augmentation of an AC Spark Plug Division WS 315A Guidance System for use in early WS 117L vehicles. ~~It is planned that one AC unit will be furnished to the contractor by the Government not later than December 1957.~~ AC technical information will be furnished to the contractor by the Government. [illegible]

b. Orbital Attitude Control - A complete system compatible with other WS 117L Subsystems based on design and mechanization accomplished under the previous Study Contract AF 33(616)-2039, Supplement 10.

2. Advanced Systems

a. Ascent Guidance - A light-weight, more accurate, WS 117L System designed around the WS 107A-1 Guidance System being developed by the contractor for the Government on another contract.

b. Orbital Attitude Control - Development of new components and system configuration capable of maintaining adequate attitude control while operating in the radiation environment of the nuclear reactor auxiliary power unit for a period of one year as a design goal.

II. DELIVERY

A. The work called for in paragraph I.B.1. above, shall be performed in a time schedule and technical data and results delivered by technical reporting in such a way as to be incorporated into related WS 117L subsystem design.

B. The work called for in paragraph I.B.2. above, shall be performed, and delivery of one (1) engineering model (suitable for flight test in a WS 117L vehicle) of each of the systems described in paragraph I.D. shall be accomplished according to the following schedule:

Item D.1.a.	Ascent Guidance System - June 1958
Item D.1.b.	Orbital Attitude Control System - August 1958
Item D.2.a.	Ascent Guidance - September 1959
Item D.2.b.	Orbital Attitude Control - January 1960

[redacted]

C. Complete specifications and drawings of all systems shall also be furnished with the engineering models, to permit fabrication of subsequent like items of equipment by a qualified manufacturing source, according to the time schedule listed in paragraph II.B. above.

D. Parts lists, specifications and drawings of components and sub-assemblies shall be furnished at the same time that they are furnished to the producer of the test and engineering models to minimize the transition time required from the engineering model delivery to delivery of subsequently produced units by a manufacturing source.

[redacted]

[redacted]

WDTR 5 December 1956

MEMORANDUM FOR COLONEL TERHUNE

SUBJECT: Report of Trip to Hq. USAF 27-30 November 1956

1. In accordance with Hq. USAF request contained in TWX, cite 58580, dated 13 November 1956, the undersigned together with Lt. Colonel Quenten A. Riepe and Lt. John C. Herther departed Western Development Division on 27 November 1956 for the purpose of participating in a presentation to Secretary Quarles at 10:00 - 29 November 1956 on the present status of the critical components of the early and feasible Advanced Reconnaissance System program.

2. We were able to discuss the proposed presentation with General Schriever on the morning of the 28th and as a result of this discussion made some rearrangements in our briefing. Further, we together with Mr. Carter and Mr. Salter of MSD/LAC prepared a "script" for each of the participants. Inclosure 1 is a copy of that script, Inclosure 2 is a list of project office, consultant and contractor personnel present for the presentation for Mr. Quarles.

3. On the evening prior to the scheduled time of the presentation, some uncertainty developed as to whether or not Secretary Quarles would be able to hear the presentation at all due to the budget blitz. Fortunately, he was able to attend as scheduled.

4. At 8:15 - 29 November 1956, Western Development Division representatives together with our "panel of experts" got together and held a dry run on the presentation. General Schriever was able to attend this session and furnished excellent guidance to the group.

5. During the presentation, Secretary Quarles asked quite a number of questions to the extent that the over-all session lasted 1 hour and 45 minutes. Since he was on a first name basis with all of our "panel of experts" the session was fairly informal. Those who attended the presentation, such as General Putt and Colonel Johnston, who are familiar with the Secretary's usual reactions to presentations of this sort, felt that we had been quite successful in satisfying the Secretary's concerns and questions concerning the system. The Secretary made several comments but they would be confusing out of context. General Putt told me later that after a

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"little more softening up by Mr. Horner and myself" we (WDD) should bring in an over-all scheduling and systems presentation. He (General Putt) is aware of our P-100 and P-200 request for 17 million and expects to be able to get us the money.

6. Lt. Colonel Riepe and I made a brief contact with Colonel R. J. Quinn, Jr. and Lt. Colonel G. M. Adkins, AFOIN-1X2. Their office had requested RADC to brief AFOIN on WS 117L. We explained the present project set-up and convinced them that at present, things were too unclear to make feasible a valid presentation to the Directorate of Intelligence.

7. I discussed with Colonel C. P. Richman and Mr. Eugene Barnard of AFOIN-Z their experiences in regard to ingelligence handling problems similar to that which can be expected with WS 117L.

8. The undersigned together with Lt. Colonel Quenten A. Riepe established initial contact with representatives of Reconnaissance Branch, Operations Control Division of the Directorate of Operations: Colonel W. E. Basye, Chief, AFOOP-OC-R, Colonel C. C. Andrews, and Major R. C. Brown. Our visit was somewhat timely inasmuch as Colonel Basye had just received a copy of the WS 117L Development Plan and Development Directive and was quite concerned over the publication of a preliminary operational concept. We advised him of the study that Western Development Division had requested from Rand which is directed to this subject (among others) and suggested that in view of the unique and somewhat complicated nature of WS 117L, it might be desirable that his office work closely with the project office in regard to weapon system documentation when such is required. The primary purpose of the visit was to assure that Hq. USAF would not come out with a preliminary operational concept until adequate time had been allowed to study the problem. It does not appear that Colonel Basye's people will press for an early issuance of this document although it is also obvious that issuance can not be too long delayed because of the many costly matters which must be resolved particularly in the training and operational planning end of the project.

3 Incls:
1. Presentation Script
2. Project office consultant & contractor personnal
3. Those in attendance at the presentation

FREDERIC C. E. ODER
Lt. Colonel, USAF
Assistant for WS 117L
Technical Operations

[redacted]

I. Introduction (Oder) 3 Minutes

II. Critical and Peculiar Subsystems for Early ARS Capability

- A. Guidance and Control (Draper) - 5 minutes
  - 1. Pre-orbital Guidance
    - a. Use of Past USAF Experience and R & D
    - b. Use of 315A System
    - c. Accuracy of System (Orbital-Ellipticity)
    - d. Feasibility of Inertial System
    - e. Time Scale of Development
  - 2. Orbital System
    - a. Stability required
    - b. Effect of Attitude Control and Stabilization on accuracy of data collecting system (be prepared to discuss interaction with visual system)
    - c. Feasibility of System
    - d. Time Schedule of Development

DOWNGRADED AT 3 YEAR INTERVALS;
DECLASSIFIED AFTER 12 YEARS.
DOD DIR 5200.10

[redacted]

In. O. #1

[redacted]

B. Visual Reconnaissance System (MacLeish and Goldmark) (15 Min)

Involves

EKC (1) Camera - Film - Readout - Ground Reconstitution

(2) State of Development

(3) Feasibility

(4) Time schedule for Development

(be prepared to answer questions regarding "Minicard" sorting and recall use in early capability)

C. Utility of Results of Pioneer ARS System (MacDonald) (10 Min)

(1) What can be seen as a function of resolution?

(2) What good is it?

(3) When does need exist?

D. Ground-Space Communications (Ridenour) (5 Min)

(1) Acquisition - our ability to do so - by what means

(2) Tracking - accuracy effects ability to position photographs - by what means - use of successive passes

(3) Data Link - bandwidth and effective picture quality

E. Battery Auxiliary Power (Salter) (3 Min)

(1) Power Requirement for early system

(2) Battery system wt. and output/lb and effect on duration

(3) Feasibility of batteries and the operational life

(4) Availability date of batteries for this use

[redacted]

III. Follow-on Systems

A. Infrared Reconnaissance (Salter) (3 Min)

- (1) Concept - Phase I and II
- (2) AICBM Warning and Tracking
- (3) Where we stand - feasibility - use of other tests and results

B. Electronic Reconnaissance (Ridenour) (3 Min)

- (1) Limitations of Satellite Ferret as function of time
- (2) ARS Approach to Ferret Problem
  - a. Signal density
  - b. New signal search
  - c. Order of battle

C. Advanced APS Development (Major Anderson) (3 Min)

- (1) Nuclear
  - a. Radioisotope
  - b. Reactor
- (2) Chemical and Solar (Mr. Salter) (3 Min)

[redacted]

Project Office Consultant and Contractor Personnel who appeared before the Secretary:

Lt. Colonel Frederic C. E. Oder - WDD

Lt. Colonel Quenten A. Riepe - WDD

Lt. John C. Herther - WDD

Dr. Duncan McDonald - Boston University

Dr. C. Stark Draper - Harvard University

Dr. Louis Ridenour - Lockheed Aircraft Corporation

Dr. Ford Tuttle - Eastman Kodak Company

Dr. Peter Goldmark - CBS Laboratories

Mr. Jack Carter - Lockheed Aircraft Corporation

Mr. Richard Leghorn - Eastman Kodak Company

Dr. Kenneth MacLeish - Eastman Kodak Company

Mr. Robert Salter - Lockheed Aircraft Corporation

[redacted]

Incl #2.

[redacted]

Those in attendance at the Presentation:

The Honorable Donald A. Quarles - Secretary of the Air Force

The Honorable Lyle S. Garlock - Assistant Secretary of the Air Force - (Financial Management)

General T. D. White - CS/USAF

Lt. General D. L. Putt - DCSD

Mr. D. R. Jackson - OASAF (Material)

Mr. William Weitsen - OASAF (R & D)

Colonel R. L. Johnston - AFDRD

Colonel A. T. Culbertson - AFDRD

Colonel F. L. Moore - AFDRD

Colonel O. G. Johnson - AFDAP

Lt. Colonel J. R. Finton - AFDDC

Lt. Colonel E. A. Doty - AFDRD

Lt. Colonel W. R. Kelso - SAFRD

Major F. J. Dillon, Jr. - AFDRD

Commander R. C. Truax - WDD (WDTR)

Lt. Colonel P. E. Worthman - Hq. ARDC (RDZGW)

Lt. Colonel V. M. Gomez - Hq. ARDC (RDZPI)

Lt. Colonel E. Gibbs - Hq. ARDC (Project Vanguard Liaison Officer)

Mr. R. D. Cooms - Hq. ARDC (RDTDW)

Colonel J. L. Armstrong - AEC

Major G. M. Anderson - AEC

Incl # 3

[redacted]

[redacted]

WDTR

23
~~15~~ November 1956

MEMORANDUM FOR RECORD

SUBJECT: Discussion of the WS 117L Facility Requirement at AFMTC

1. A meeting was held in Colonel Leonhard's Office (WDI) to discuss the WS 117L facility requirement at AFMTC. Colonel Leonhard, Mr. Mollelo (WDI) and Lt. Colonel Oder and Lt. Colonel Riepe (WDTR) were present.

2. The purpose of the meeting was to resolve the Western Development Division position on the 7.4 million program submitted by AFMTC in their support of WS 117L. Essentially it was agreed that our DF of 23 Oct 56 to WDI and WDT was still valid. i.e., that we would not require the construction of the new facilities as proposed by AFMTC - rather we would use the 107-A facilities on an availability basis.

3. The meeting moved from Colonel Leonhard's Office to Colonel Terhune's Office and Colonel Jacobson joined the group. Colonel Leonhard summarized to Colonel Terhune as follows:

a. The 107-A facilities at AFMTC are sufficiently flexible to permit those tests currently planned - i.e. (eight) for WS 117L to be accomplished on 107-A facilities with modification as outlined in the DF of 23 Oct. 56 to WDI - WDTT.

b. The WS 117L facilities required for FY 59 are such that they can be included in a $50,000,000 Guided Missile authorization already established.

c. Facilities people in Hq. USAF, General Brown, are currently running a survey to determine the availability of existing government owned facilities that are located where they would be useful to the WS 117L Program. This effort will reduce the total facilities requirement if successful.

d. Based on this it was recommended to Colonel Terhune that the AFMTC program for WS 117L facilities be reduced to that required in the 23 Oct 56 DF and Hq. USAF and AFMTC be so advised.

4. Colonel Terhune concurred, emphasizing his belief that the current AFMTC facility program would provide for WS 117L requirement as well as the 107-A.

DOWNGRADED AT 12 YEAR
INTERVALS; NOT AUTOMATICALLY
DECLASSIFIED. DOD DIR 5200.10

[redacted]

[redacted] [redacted]

5. Colonel Jacobson stated that Pads 12 and 14 will be shut down for a three month period beginning Oct. 57 for change over from Series A to Series C firing. Modifications to the facilities to make them compatible with WS 117L should be planned and programmed for in this period.

SIGNED

QUENTIN A. RIEPE
Lt. Col., USAF

[redacted]

[redacted]

WDTR

NOV 20 1956

Mr. Frank Collbohm, Director
The Rand Corporation
1700 Main Street
Santa Monica, California

Dear Mr. Collbohm:

The Western Development Division has been assigned the responsibility for the development of WS 117L, the Advanced Reconnaissance System. System Requirement No. 5, 17 October 1955, Western Development Division Development Plan WS 117L, 2 April 1956, USAF Development Directive No. 85, 3 August 1956, and ARDC System Development Directive WS 117L, 17 August 1956, have defined the system, the requirement for the system, the objectives of the system to be developed, the development plan and directed the development of the system. Thus, only the operational aspect of the system has not been carefully analyzed and defined.

Members of the Western Development Division have informally discussed the operational aspects of WS 117L with Messrs. G. H. Putt and Ed Barlow of Rand and have asked them to consider the development of an operational concept for WS 117L as a problem suitable for Rand to undertake. The problem as presented to Rand contains the following items:

1. Determine what information can be retrieved from the data collected by the WS 117L systems, including visual, infrared and ferret sensors, that will be useful on a national basis. (Useful on a national basis is contrasted here with data useful to the Air Force and is meant to include that information of importance to the President of the United States and his Special Advisors, the Departments of State, Commerce, Agriculture, Defense and special agencies having use for the type of information that can be retrieved. Further, information important on a national basis is to include that intelligence that can place the United States in a more favorable bargaining position among the international family of nations.)

2. Determine the optimum mixing ratio between visual, ferret and infrared data collected to provide for maximum output to satisfy the national intelligence requirements.

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DECLASSIFIED. DOD DIR 5200.10

WDTR 56-213

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3. Establish the relative priority in determining the "quick reaction time" necessary to supply the needs of the various intelligence customers on a national basis.

4. Determine the effect of accuracy of coverage, location accuracy, ground resolution, methods of analysis and other pertinent factors that would vary the ability of the system to fulfill the various national requirements.

5. Using the inputs of items 1 through 5 above, devise an operational concept(s) for WS 117L that will provide planning inputs necessary to write the Qualitative Personnel Requirements Information Reports, the Logistics Plan, the Final Operational Plan, Technical Crew and Training Plans, and the Installation Plan as defined in Air Force Regulation 5-47, dated 29 August 1956.

Rand's interest and investment in the Air Force Satellite Program and broad experience in this type of analysis make this problem peculiarly Rand-like. Since the study may require a variety of talents and special inputs involving association with sensitive aspects of the broad national intelligence community, Rand is in a favorable position to tackle this problem.

The development of WS 117L has been justified on the basis of the military, particularly Air Force, intelligence requirements. Certainly, if the system is capable of producing intelligence of interest on a national basis, this capability should be exploited to the fullest. An early answer to the full WS 117L capability and how it can be exploited operationally is of vital importance to the Western Development Division in the early stages of development of WS 117L.

The proper people to further discuss this problem with you or assist you in any way in the analysis of the problem can be made available at your request.

SIGNED

CHARLES H. TERHUNE, JR.
Colonel, USAF
Deputy Commander
Technical Operations

[redacted]

WDTR
Lt. Col. Riepe

1s
1344

[redacted]

WDTR 56-213

WDTR 15 November 1956

MEMORANDUM FOR RECORD

SUBJECT: Management Problem Within the Lockheed Aircraft Corporation

1. This memorandum is written for the purpose of pointing out an apparent management problem within the Lockheed Aircraft Corporation, Missile Systems Division, WS 117L organization. If the problem continues, it will seriously effect the utilization of the Launch and Down-Range Instrumentation at AFMTC. This, in turn, has direct effect on the WS 117L program schedule.

2. The problem can be set up as follows:

In order to comply with the requirements established by AFMTC that are necessary for organizations using the presently installed (or special) launch and down-range equipment, it is necessary that using agencies comply with the procedures established by the "Test Requirements Handbook", AFMTC (AMDC). In this handbook, the instructions for Operational Directives, Range Safety and Using Agencies having special requirements (i.e. WS 117L) are explained.

3. WDTR has been informed by personnel from LAC-MSD Test Organization that this type of thing is standard operating procedure with them, and that they have nearly completed this effort. They admit that very few of the WS 117L technical requirements have been given to them by the Research Group. Clearly, this gives rise to possible errors or omissions. The Test Group is apparently very familiar (through personal experience) with the layout and situations that exist in fact at the AFMTC and WADC.

4. On the other hand, technical WS 117L requirements are being established within the LAC-MSD Research Group. Requirements which will require the use of "on station" unmodified facilities at AFMTC, plus the installation of specific WS 117L equipments at AFMTC are being delineated. However, since this effort is being accomplished by the Research Group, there is a tendency to consider technical, rather than operational problems. This group admits to general non-familiarity with AFMTC and the operational techniques already established at the test centers.

5. It would seem that this is an organizational or management problem that should be resolved immediately within LAC-MSD. Errors or omissions caused by lack of management effectiveness in coordinating these apparent independent efforts, can cause serious WS 117L program schedule difficulties in the very near future.

6. The programming of facilities at test centers is a complex problem which has an inherent fixed lead time which is troublesome at the best. This consideration and the early program schedule for WS 117L at AFMTC makes it essential that careful, coordinated planning must be done.

7. This problem has been brought to the attention of the various people concerned by WDTR in the past, and is being made a matter of record by this memo.

SIGNED

WILLIAM O. TROETSCHEL
Captain, USAF
WS 117L Office
Technical Operations

WDTR dh
Capt. Trootschel 1344

SUBJECT: Manpower and Functions

TO: [illegible] FROM: [illegible] DATE: NOV 13 1956 COMMENT NO. 2

LtColPorter/mmm/[illegible]

Attached are functional statements covering the Test Group, Special Test Branch, and 107A-1, 107A-2, 315A and 117L Branches.

FREDERICK S. PORTER, JR.
Lt. Colonel, USAF
RICHARD K. JACOBSON, Lt Col, USAF
Chief, Test Group

1 Incl:
[illegible] Functional Statements

9 November 1956

FUNCTIONAL STATEMENTS - WDTT

TEST GROUP

Responsible for formulation, dissemination and revision of a test philosophy uniquely suited to the requirements of the Ballistic Missile Program. Maintains Master Test Plan for all phases of systems testing. Reviews progress of systems testing to insure that military requirements of the weapon system is clearly demonstrated. Is directly responsible for the timely preparation of test centers to support testing required by this program. Is central point of contact for all testing requirements placed upon DOD field testing installations.

SPECIAL TEST BRANCH

Initiates or monitors studies and tests other than complete missile systems tests in support of technical groups and weapon systems offices. Tests include sled tests, drop tests, and others pertaining to development of single components. Supervises preparation of test requirements; implements test programs. Selects center to handle tests; performs liaison with centers to assure test support. Initiates study contracts with schools or industry for investigation of special technical problem areas.

107A-1, 107A-2, 315A and 117L BRANCHES

Maintains Master Test Plan for all phases of weapon system testing, including purpose, schedules, sites, and conducting agency. Reviews all testing to insure demonstrated compliance with requirements. Insures preparation and approval of requirements documents and Center Data Acquisition and Support Plans.

[redacted]

WDTR

[redacted]

NOV 9 1956

MEMORANDUM FOR RECORD

SUBJECT: Sub-Contract Difficulties with MIT

1. Meeting with representatives from WDTR, BMO, LAC and the AFPR, LAC. Those in attendance were:

Mr. C. F. Hagenmaier - LMSD
Mr. W. V. Tyminski - LMSD
Mr. J. B. McChesney - LMSD
Mr. John H. McLaughlin - ACO - AFPR
Mr. Eugene Silberman - BMO - MCPTS
Major R. Rowland - BMO - MCPTS
Lt. Colonel R. E. Hogan - BMO - MCPTG
Major R. H. Cline - BMO - MCPTG
Lt. Colonel Quenten A. Riepe - WDD - WDTR
Lt. John C. Herther - WDD - WDTR

2. Subject Problem: Sub-Contract Difficulties with MIT

Statement: The Air Force will not pay "donations or gifts" to MIT on sub-contract status to LMSD in accordance with the ASPR's and the AFPI's. The "donation" is in the form of a higher "burden" cost (100%) to industrial customer in contrast to a 45% burden or overhead cost to the Air Force.

Status: Lockheed Missile Systems Division has asked the ACO-AFPR to approve MIT as a subcontractor, but has not presented a complete sub-contract proposal to the ACO. This is the reason the ACO has not forwarded the LMSD letter to the Project Office with comments.

3. The MIT has been agreed to by the Project Office, the BMO guidance procurement office, Colonel Box's Office (WDTLG) an Independent R-W Study, and the LMSD as the preferred guidance and control contractor for WS 117L. This is based on:

a. The large amount of MIT designed equipment for WS 315A that can be made directly applicable to WS 117L use.

b. The availability of these systems from the A. C. Spark Plug Company, the fabricator and supplier of these 315A components.

c. The large amount of Air Force facilities provided MIT and A. C. Spark Plug that can be fully utilized in the WS 117L work.

DOWNGRADED AT 12 YEAR
INTERVALS; NOT AUTOMATICALLY
DECLASSIFIED. DOD DIR 5200.10

[redacted]

WDTR 56-216

[redacted]

d. These systems will have had 27 IRBM flight tests prior to WS 117L receiving hardware from A. C. Spark Plug.

e. The accepted competence of the available MIT group to do the WS 117L work.

f. The long time (2 + years) effort of this group on the WS 117L problem under contract to WADC.

4. Recommendations: That, since MIT will not make a special case of the WS 117L problem and reduce their rates to LMSD for sub-contract purposes, the Air Force would like to pursue the following courses of action in the order of preference as they are presented:

a. Attempt to obtain a deviation from the ASPR and AFPI to allow the higher overhead rate on sub-contract. This will require special justification to show that this route will cost the Air Force less than if the second course of action were followed, which is:

b. Direct contract between the Air Force and MIT on an associate contractors basis, whereby the lower MIT overhead rate could be realized. Under this plan, the LMSD would have placed on them the responsibility of providing Technical Direction to the MIT product and its compatibility with the WS 117L system. This responsibility would be recognized in the MIT contract and would require Administrative and Technical Direction Meetings between LMSD-WDTR - MIT - BMO.

c. Forget MIT and select an alternate sub from a competent group, including, NAA, Sperry, ARMA, etc.

5. Action agreed to:

a. LMSD will present to the ACO a complete (with costing) sub-contract proposal within three days so that he can accept or refer it for exception to the ASPR and AFPI.

b. LMSD will study the associate contract method for acceptability to the LMSD.

SIGNED

QUENTEN A. RIEPE
Lt. Colonel, USAF
WS 117L Office
Technical Operations

[redacted]

[redacted]

[redacted]

(U) Operational Concept for WS 117L

WDO
WDT
(IN TURN)

WDTR

NOV 9 1956
F. C. E. Oder/ls/1343

1. Shortly after the Development Plan WS 117L was approved and the Development Directive received, it was realized that there was an immediate need for a study to devise an operational concept for WS 117L.

2. Several organizations were considered as being capable of studying the problems of an operational ARS. Cost, unfamiliarity with the ARS, and the ability of the organization to contact the necessary parts of the National Intelligence community reduced this group down to the Rand Corporation and the Advanced Study Group of the Air University Command. This problem was discussed with Colonel Terhune, who approved of informally discussing this with Rand as a possible problem for them to consider as part of their program of studies for the Air Force.

3. Mr. Barlow, Chief of the Engineering Division of Rand, assigned the problem of defining the ARS Operational Concept and outlining the study team requirements to Mr. A. H. Katz and Mr. Merton Davies, who have had several sessions with Lieutenant Colonel Riepe of this office. Messers. Katz and Davies have indicated that there is considerable interest within Rand in the problem. However, they have requested the WDD to state their interest in the results of such a study to the Management of the Rand Corporation. The expression of this WDD interest and the outline of the problem as we see it is the purpose of the attached letter to Rand.

4. Mr. Katz felt that the letter should be signed as high in WDD as necessary to represent the WDD interest.

SIGNED

FREDERIC C. E. ODER
Lt Colonel, USAF
Assistant for WS 117L
Technical Operations

1 Incl
Ltr fr WDTR to Rand Corp
2 pgs, 3 cys
(WDIR 56-213)

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DOWNGRADED AT 3 YEAR INTERVALS;
DECLASSIFIED AFTER 12 YEARS.
DOD DIR 5200.10

WDTR 56-214

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Organisation and Manning for WS 117L Program

WDT

WDTR

NOV 6 1956

Lt Col Oder/eh/1344

1. Western Development Division has been assigned the responsibility for the development of WS 117L, a system many times more complex and sophisticated than any yet attempted. It has been determined that the WDD will, with the assistance of the ARDC Centers and other consultants, provide the technical direction and management of this program. The attached organization and manning is what we believe will be required to adequately do this job. Personnel selected to fill the positions in the proposed organization should be carefully selected to assure top quality management and direction of the various facets of the system.

2. In considering our manning requirements for approval there are several factors which should be given consideration:

a. WS 117L has ten (10) closely interrelated subsystems as well as a flight test program and a program in the measurement of the external environment. Because of the technical intricacies of each of these and the many problems posed by their individual development together with the economical integration of these into a workable and usable system, considerable supervision of the prime contractor (and his subcontractual efforts) by the WSPO is mandatory. Without such supervision the costs of the program would undoubtedly be much higher than would be the case with close Air Force supervision.

b. Because of previous management decisions, the WS 117L Project Office, unlike the case of WS 107A-1, WS 107A-2 and WS 315A, is solely responsible for the technical direction and program management for the government for the ARS. For this reason, comparisons between the authorised strength of WDTR and the other WDD project offices are not too valid.

c. Program complexity rather than total funding should be the yardstick for WSPO manning. The cost to the Air Force of the proposed WSPO manning is, nevertheless, quite reasonable in relation to the amount of money which will be spent on contract.

3. This process of screening and selecting personnel to man the organization will take time. However, it is felt that the following goals are the optimum rate of build-up:

a. Personnel on hand as of 5 November 1956:

1 Assistant for WS 117L	Lt Colonel
1 Deputy Assistant for WS 117L (Acts as Chief, System Integration Branch)	Commander
1 Chief, Plans and Programs Branch	Lt Colonel
1 Chief, Resources Management Section	Major
5 System Integration Project Officers	1 Major, 3 Captains and 1-1/Lt.
9 Total 9 Assigned Officer Personnel	

b. Planned build-up to 1 January 1957:

1 Chief, Facilities and Test Branch
1 Facilities and Equipment Project Officer
1 Test Plans and Logistics Project Officer
2 Product Engineering Project Officers
5 System Integration Project Officers
1 Resources Management Project Officer
1 Program Management Project Officer
12 Total additional personnel

21 Total assigned officers

c. Planned build-up to 1 July 1957:

2 Program Management Project Officers
1 Resources Management Project Officers
2 Product Engineering Project Officers
2 Facilities and Equipment Project Officers
1 Test Plan and Test Logistics Project Officers
9 Total additional personnel
30 Total assigned officer personnel

d. By 1 January 1958 certain subsystems of the WS 117L will have reached the point of limited production. This will require six (6) additional military personnel in the System Engineering Section. (Not shown on the organization chart)

Total goal military personnel by 1 January 1958 is estimated to be 36 officers.

e. Civilian support personnel required:

1 GS-7 Administrative Assistant for Assistant for WS 117L
9 Secretary-typists - 8 each GS-4; 1 each GS-5

Secretaries to be assigned as follows:

3 in Plans and Programs
3 in System Engineering
2 in Facilities and Test
1 in the Office of Deputy Assistant for WS 117L

The build-up rate for secretarial help would be proportional to the military personnel build-up rate.

4. As you can see from the proposed organisation chart and the job descriptions submitted, we intend to make full use of the presently existing staff functions within WDD. For example, the Facilities Group will, of necessity, work very closely with the WDI organisation; the Plans and Operations functions will be closely coordinated and accomplished with the assistance of associated parts of WDT, WDS and WDO, etc.

5. Since there will be considerable effort required to recruit the number and type of personnel required to man the proposed organisation, it is requested that we be authorised to requisition personnel up to the 1 January 1957 level immediately. Counting those officers on hand and under orders (less a loss of one (1) to WDTC per agreement with Colonel Norton and Colonel Glasser on 1 Nov 1956) an additional ten (10) officer vacancies will be required to bring the authorised strength to the proposed twenty-one (21) by 1 January 1957.

SIGNED

1 Incl
Organisation and Manning
for WS 117L (bound)

FREDERIC C. E. ODER
Lt Colonel, USAF
Assistant for WS 117L
Technical Operations